User's Manual for ZVF9V-G/P Vector Inverter

Foreword

Thank you very much for your purchase of the inverter ZVF9V series.
This manual introduces the installation, operation, function setting, trouble shooting and etc. of the inverter ZVF9V series..
Incorrect installation or use may result in damage or other accidents. Do read all instructions in detail before installing or operating.
Please forward this manual to the end user, and keep it handy for quick reference.
If there are any doubts or questions, please contact the Technical Service Center of our Company.

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Chapter 1 Safety Instructions

1.1 Safety Symbols and Definitions

The safety instructions described in this manual are very important. To avoid any error that may result in damage to equipment, injury to personnel or loss of property, do read and clearly understand all of the safety symbols, symbol definitions and be sure to observe the indicated safety instructions below.

Safety Symbols	Symbol Definitions
HAZARD	This symbol indicates hazardous HIGH VOLTAGE. Any incorrect operation may result in serious damage to the equipment or death to personnel.
WARNING	This symbol indicates that any incorrect operation can result in damage to the equipment or minor to moderate injury to personnel.
CAUTION	This symbol calls your attention to follow the instructions while in operation or in use.
TIP	This symbol calls attention to some useful messages for the user.
FORBIDDEN	This symbol indicates anything forbidden to do.
COMPULSORY	This symbol indicates something must do.

1.2 Application Range

CAUTION

This inverter is applicable to general industrial purpose three-phase AC asynchronic electric motor.

WARNING

- This inverter can not be used in the equipment that may result in threat or injury to personnel due to inverter trouble or error, such as nuclear power control equipment, aviation equipment, transportation equipment, life supporting system, safety equipment, weapon system and etc. Please consult with our company before using it for special purposes.
- This product is made under strict quality control and supervision. But when used in some key equipment, protective measures should be taken to avoid further extension of accident due to inverter trouble.

1.3 Installation Ambient

CAUTION

- Be sure to install the inverter in a well-ventilated indoor location. To get the best cooling effect, it is recommended to fix the inverter vertically, and extra ventilation devices are needed when installed horizontally.
- Be sure that the ambient temperature is between -10~45℃. If the temperature is higher than 40℃, please remove the upper cover. If the temperature is higher than 50℃, forced heat radiation or derating is needed from the external. It is recommended not to use the inverter in such a high temperature. Otherwise, it may greatly reduce the service life of the inverter.
- The ambient humidity is required to be lower than 90% without dew condensation.
- The inverter shall be installed in a place where the vibration is less than 0.5G. Otherwise, it may fall and cause damage to the equipment. It is also noteworthy that the inverter could not bear any sudden bump.
- The inverter should be kept away from electromagnetic interference (EMI), flammable and explosive ambient.

WARNING

• Be sure to install the inverter on metallic materials (i.e., metal). Otherwise, there is the danger of fire.
• Be sure not to let the foreign matter enter the inverter, such as wire clippings, spatter from welding, metal (zinc or ferrous) meshavings and etc. Otherwise, there is the danger of getting burned due to short circuit.

1.4 Cautions for Installing

HAZARD

• Do not operate electrical equipment with wet hands.
• Do not operate wiring unless the power supply is completely off.
• Do not open the front cover or perform wiring while the inverter is powered ON. Otherwise, there is the danger of electric shock.
• Do wait at least 10 minutes after the power is disconnected before performing the work of wiring or inspection. Otherwise, there is the danger of electric shock.

WARNING

• Do not install or operate if the inverter is damaged or has parts missing to prevent injury to personnel or loss of property.
• The main loop terminal should be tightly connected to the cable. Otherwise, the inverter may be damaged due to loose contact.
• The ground terminal must be reliably and properly grounded to ensure security. To avoid common ground impedance, multi-piece inverters should be grounded at one shared point, as shown in the Figure 1-1.

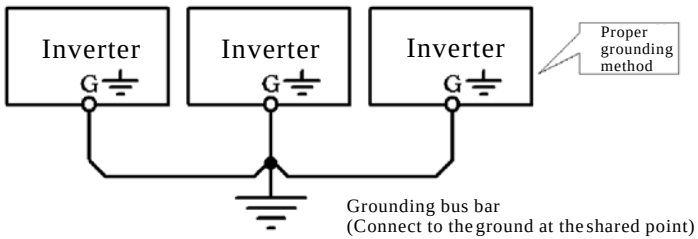


Figure 1-1

FORBIDDEN

• DO NOT connect control terminals (except terminals marked "TA", "TB" and "TC") to AC 220V power supply, which may cause damage to the inverter.

• DO NOT connect AC power supply to the output terminals marked "U", "V" and "W". Otherwise, it may cause damage to the inverter, as shown in the Figure 1-2.

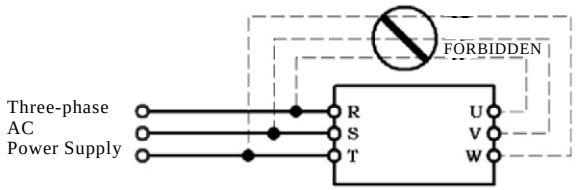


Figure 1-2

COMPULSORY

• DO install a no-fuse circuit breaker or leakage protective circuit breaker in the side of inverter input power supply to prevent expanding of accident due to an inverter problem.

CAUTION

• It is not advisable to install an electromagnetic contactor in the side of output power supply, because the operation of open and close to the contactor when the motor is running may cause damage to the inverter arising from over-voltage produced during this process. But it is still necessary to install a contactor if one of the following three points occurs:
1.The system of frequency converting governor used to control energy-saving usually works at a rated rotation speed. To run the governor economically, there is a must to remove the inverter.
2.The inverter participates in some import procedure and cannot stop operating for a long period of time. To realize free shift in various control systems and improve the reliability of these systems, there is a must to install a contactor.
3.When an inverter controls several motors, there is a must to install a contactor.
Caution: DO NOT operate the contactor if there is output of the inverter.

1.5 Cautions for Operation

HAZARD

• Do not operate electrical equipment with wet hands.
• An inverter stored for a year or longer should be given powerup test before use so that the main circuit filter capacitor could be recovered. When the inverter is in the state of powerup, it is necessary to raise the voltage gradually to the rated value with a voltage regulator. Generally, the charging time should be controlled within 1~2 hours. Otherwise, there is the danger of electric shock or exposure.
• Do not touch the inner side of the inverter while the power is ON, nor put any foreign matter, i.e., rod or other matter inside the inverter. Otherwise, it may result in serious damage to the equipment or death to personnel.
• Do not open the front cover while the inverter is powered ON. Otherwise, there is the danger of electric shock.
• Be careful to select the Restart Mode. Otherwise, there is the danger of personnel death.

WARNING

• If the inverter runs at a frequency higher than 50Hz, DO confirm it is within the speed range acceptable by your motor bearing and mechanical device. Otherwise, there is the danger of damage to the motor.
• It is not advisory to run the reduction box, gear and other mechanism that need lubricating at low speed for a long period. Otherwise, it may reduce the service life of these equipment or even damage the equipment.
• A general motor should be derated before use due to less effective of heat dissipation when it runs at a low frequency. If it is a constant torque load, then a forced method or a special variable frequency motor should be used to release heat.
• DO cut off the power supply of an inverter set aside for a long time to avoid foreign matter or other things enter in it which may cause damage to the inverter or even lead to fire.
• The output voltage of inverter is PWM impulse wave. DO NOT install a capacitor or surge current sink (i.e., a varistor) in the inverter output port. Otherwise, there is the danger of fault tripping of the inverter or damage to its power elements. DO remove such kind of things if already installed. See the Figure 1-3 below.

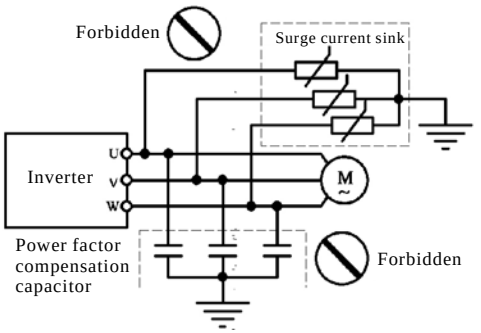


Figure 1-3

CAUTION

• Motor insulation should be checked before the inverter is used for the first use or reused after a long-term idle. Be sure the insulation resistance measured is no lower than 5MÙ.
• If the inverter is used beyond the range of allowable working voltage, then an extra step-up or step-down voltage transformer shall be configured.
• Due to thin air in a place where the altitude is higher than 1,000m, the heat dissipation of inverter will be less effective. Hence derating should be done before use. In general, when the height rises by 1,000m, the rated voltage of the inverter shall reduce by 10%. Refer to the Figure 1-4 for details of the derating curve.

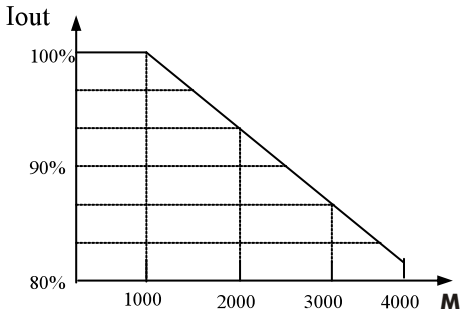


Figure 1-4 Diagram of Inverter Derating Curve

FORBIDDEN

• DO NOT touch the radiator or charging resistor of the inverter with hand(s). Otherwise, there is the possibility of getting scalded.

• DO NOT proceed direct start-stop operation frequently with a contactor or any other switch devices in the inverter input side. As large charging current exists in the main circuit of the inverter, frequent power-on/off may produce cumulative effect resulting in heat fatigue of inverter components and great reduction of service life of the inverter. See the detail in the Figure 1-5.

Three-phase AC Power Supply

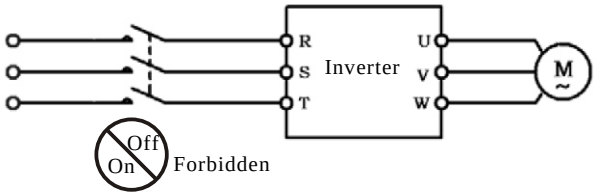


图 1-5

COMPULSORY

- In case abnormalities occur, such as smoke, off odor, strange sound, DO cut off the power supply immediately, overhaul the equipment or turn to the agent for help via phone call.

1.6 Cautions for Disposing

WARNING

- Exposure may happen when the electrolytic capacitor (ELCC) of the inverter burns. Be careful to cope with it.
- The plastic parts on the operator panel will give off toxic gas when getting burned. Be careful to cope with it.

CAUTION

- Dispose damaged inverter as industrial waste.

Chapter II. Introduction to the Product

2.1 Unpacking and Inspection upon Arrival

This product is guaranteed a high level of quality with strict outgoing inspection, crushproof and shockproof packaging. But this does not preclude damage to the product due to heavy collision or strong extrusion. So it is necessary to unpack the inverter upon arrival and perform these steps:

①Check whether there is a deformed or damaged casing; or any shattered component.

②Check the specifications label of the inverter and make sure it matches the product part number you've ordered.

③Check whether the items in the packing list are in readiness or not.

If there is any problem with the above-mentioned contents, please contact the supplier or Ziri Company immediately.

2.2 Demonstration of the Model

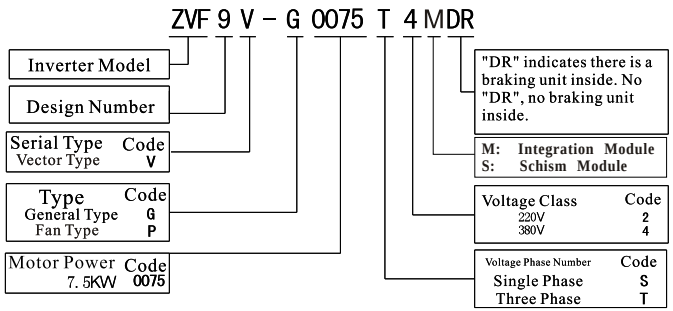


Figure 2-1 Inverter Model Demonstration

2.3 Specifications Label

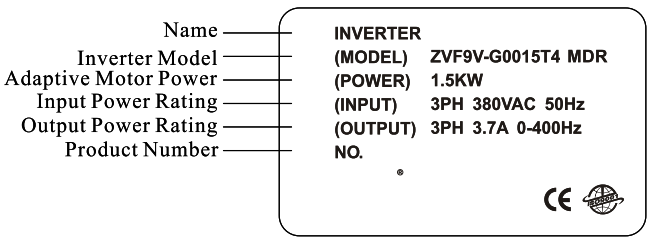


Figure 2-2 Inverter Specifications Label

2.4 Outside Drawing & Structure

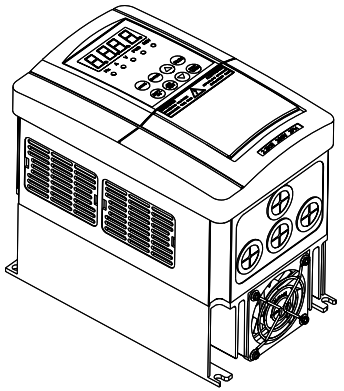
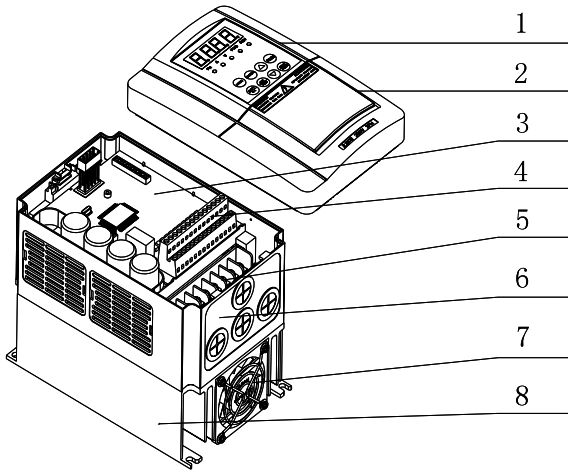


Figure 2-3 Model A Outside Drawing



1. Operator Panel 2. Upper Cover 3. Control Panel 4. External Control Terminal 5.Power Terminal 6. Lower Casing 7.Fan 8.Base

Figure 2-4 Model A **Structural Representation**

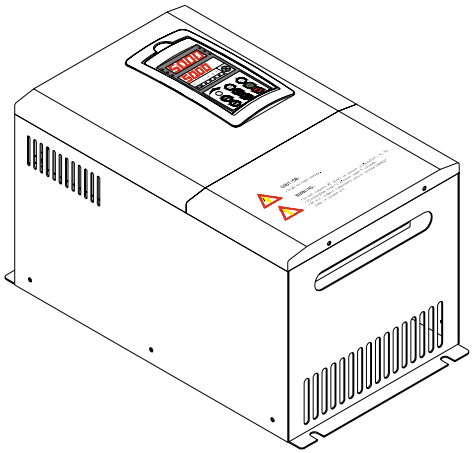
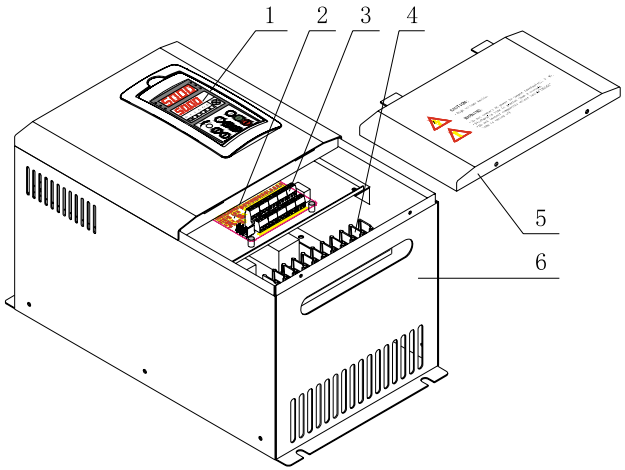


Figure 2-5 Model B Outside Drawing



1. Operator Panel 2. Control Panel 3. External Control Terminal 4. Power Terminal
5. Lower Cover 6. Casing

Figure 2-6 Model B Structural Representation

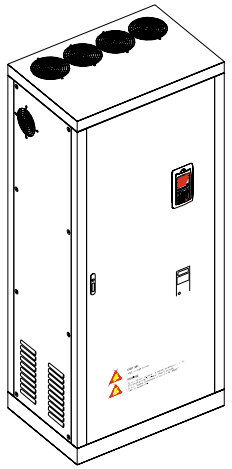
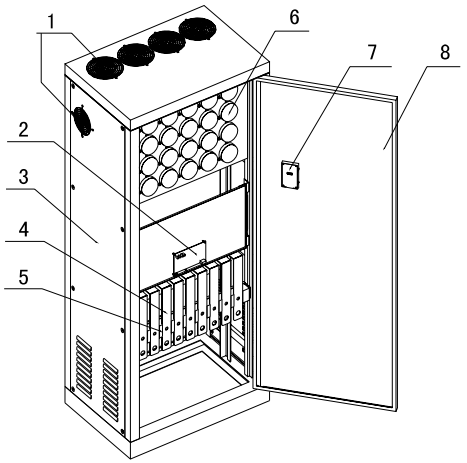


Figure 2-7 Model C Outside Drawing



1.Fan 2. Control Panel 3.Cabnet Body 4. Wiring Copper Bar 5.Power Terminal
6. Electrolytic Capacitor (ELCC) 7. Operator Panel 8. Cabinet Door

Figure 2-8 Model C Structural Representation

2.5 Models and Specifications

Table 2-1 Inverter Models and Specifications

Inverter Models (G: Constant Torque Load) (P: Fan or Pump Load)	Input Voltage (V)	Rated Output Current (A)	Adaptive Motor Power (KW)
ZVF9V-G0007T2/S2	220	4.0	0.75
ZVF9V-G0015T2/S2	220	7.5	1.5
ZVF9V-G0022T2/S2	220	10.0	2.2
ZVF9V-G0037T2/S2	220	16.5	3.7
ZVF9V-G0055T2	220	25	5.5
ZVF9V-G0075T2	220	33	7.5
ZVF9V-G0110T2	220	49	11
ZVF9V-G0150T2	220	65	15
ZVF9V-G0185T2	220	75	18.5
ZVF9V-G0220T2	220	90	22
ZVF9V-G0007T4	380	2.3	0.75
ZVF9V-G0015T4/P0015T4	380	3.7	1.5
ZVF9V-G0022T4/P0022T4	380	5.0	2.2
ZVF9V-G0037T4/P0037T4	380	8.5	3.7
ZVF9V-G0040T4/P0040T4	380	9.5	4.0
ZVF9V-G0055T4/P0055T4	380	13	5.5
ZVF9V-G0075T4/P0075T4	380	17	7.5
ZVF9V-G0110T4/P0110T4	380	25	11
ZVF9V-G0150T4/P0150T4	380	33	15
ZVF9V-G0185T4/P0185T4	380	39	18.5
ZVF9V-G0220T4/P0220T4	380	45	22
ZVF9V-G0300T4/P0300T4	380	60	30

Inverter Models (G: Constant Torque Load) (P: Fan or Pump Load)	Input Voltage (V)	Rated Input Current (A)	Rated Output Current (A)	Adaptive Motor Power (KW)
ZVF9V-G0370T4/P0370T4	380	76	75	37
ZVF9V-G0450T4/P0450T4	380	92	90	45
ZVF9V-G0550T4/P0550T4	380	113	110	55
ZVF9V-G0750T4/P0750T4	380	157	150	75
ZVF9V-G0900T4/P0900T4	380	180	176	90
ZVF9V-G1100T4/P1100T4	380	214	210	110
ZVF9V-G1320T4/P1320T4	380	256	250	132
ZVF9V-G1600T4/P1600T4	380	304	310	160
ZVF9V-G1850T4/P1850T4	380	363	360	185
ZVF9V-G2000T4/P2000T4	380	384	380	200
ZVF9V-G2200T4/P2200T4	380	423	415	220
ZVF9V-G2500T4/P2500T4	380	484	470	250
ZVF9V-G2800T4/P2800T4	380	543	510	280
ZVF9V-G3150T4/P3150T4	380	612	585	315
ZVF9V-G3500T4/P3500T4	380	680	645	350
ZVF9V-G3750T4/P3750T4	380	706	675	375
ZVF9V-P4000T4	380	796	750	400

2.6 Technical Indications

Table 2-2 Description Summary for Technical Indications

Item		Item Description
Input	Rated voltage, frequency	Single/three-phase 220VAC, three-phase 380VAC, 50Hz/60Hz
	Allowable voltage range	Voltage fluctuation range：-20%~+20% Voltage unbalance rate <3%；frequency fluctuation ≤ ±5%
Output	Rated voltage	Three-phase 0 ~ input voltage VAC
	Frequency	0.00 ~ 400.00Hz
Overload capacity		Type G：150% 1 minute；180% 1 second；200% transient protection Type P：120% 1 minute；150% 1 second；180% transient protection
Control function	Modulation method	Optimal space voltage vector PWM modulation
	Control method	Speed sensorless vector control (SVC)
	Frequency accuracy	Digital setting：Max. frequency× ±0. 01% Analog setting：Max. Frequency× ±0. 2%
	Frequency resolution	Digital setting：0.01Hz Analog setting：Max. Frequency×0. 1%
	Starting frequency	0.00 ~ 10.00Hz
	Torque lifting	**Automatic torque lifting**：To lift the torque automatically according to the output current. **Hand-operated torque lifting**： Range: 0.1~30.0%
	Slip compensation	Setting range：0~150%. The inverter output frequency can be auto-regulated within this range according to the motor load so as to reduce the speed variation of the motor due to load fluctuation.
	Acceleration/deceleration time	0.1~3600.0 sec/min, which can be set in sequence.
	Carrier frequency	1.0~15.0KHz
	Jog function	Jog frequency range：0.01~400.0Hz **Jog acceleration/deceleration time, 0.1~3600.0 can beset.**
	V/F curve	1.linear curve；2.quadratic curve (conic)；3.User defined V/F curve

Item		Item Description
Control Function	Automatic energy-saving operation	Auto optimize V/F curve according to load fluctuation to realize energy-saving operation.
	Auto voltage regulation (AVR)	When the network voltage changes, it can regulate PWM output automatically to maintain constant voltage.
	Built-in PID	This can form a convenient closed-loop control system (CLCS), and is applicable to pressure control, flow control and other process control.
Operating function	Operating command	operator panel control, external terminal control and COM control
	DC braking	Panel potentiometer setting, operator panel ▲▼ setting, external terminal up/down setting, analog voltage signal or external potentiometer setting, analog current signal setting, analog assembly setting, 485 COM setting and etc.
	Input Signal	Forward/Reverse signal, multiple speed signal, failure signal, reset signal and etc.
	Output signal	Programmable relay, open-collector output, failure signal output and etc.
	Multi-function analog and digital output terminal	This can realize the output of frequency, current and other physical quantity by outputting 0~10V or 0~20mA DC signal and 0~10KHz digital signal.
Braking function	Dynamic braking	With an external braking resistor, the maximum braking torque may reach 100%.
	DC braking	This can be selected when the motor starts or stops with the action frequency of 0~20Hz, action **current** level of 0~100% and actuation time of 0~ 30 sec., which can be set in sequence.
Other functions		**Leap frequency, Jog function,counter,trace to rotating speed, instant shutdown restarting, Frequecny upper/lower limitation ,acceleration/deceleration mode regulating,frequency meter and voltmeter output, multiple speed/program operation, two-wire/three wire control, vibration frequency control,Multi-function input terminal selection, Failure auto reset and 485COM.**
Protection function		Input open-phase protection, over-current protection, overload protection, under voltage protection, overheating protection and etc.

Item		Item Description
LED, LCD display		Real-time display the running state, monitoring parameters, function parameters, diagnostic trouble codes (DTC) and other information of the inverter.
Matching parts		Brake assembly, remote operator panel, connecting wire, communication panel
Ambient	Place to be used	Indoor location free from direct exposure to sunlight, high humidity or dew condensation, high levels of dust, corrosive gas, explosive gas, inflammable gas, oil mist, salt and etc.
	Altitude	Below 1,000M
	Ambient Temperature	-10~+45℃ [Bare Machine:-10~+50℃]
	Humidity	20~90%RH without dew condensation
	Vibration	<0.5G
	Storage Temperature	-20~+60℃
Structure	Protective Class	Ip20
	Cooling system	Forced air cooling
	Installation	wall mounted or floor-type actuator

Chapter 3 Inverter Installation and Wiring

3.1 Installation

3.1.1 Use the inverter in the following environmental conditions:

- Altitude: Maximum 1000m above sea level
- Ambient Temperature: -10~+45℃ [Bare Machine: -10~+50℃]
- Humidity: 20~90% RH (Non-condensing)
- Ambient: Indoor places free from direct exposure to sunlight, dust, corrosive gas, flammable gas, oil mist, steam, drip and salt.
- Vibration: < 0.5G

3.1.2 Installation Space and Direction

To get better cooling effect and for the convenience of maintenance, the inverter shall be installed vertically with enough space left (refer to the figure 3-1). When two or more inverters are fixed in the same cabinet, it is recommended to fix them in parallel and horizontally to reduce heat produced by them (refer to the figure 3-2). When there is a must to fix them vertically, please fix an insulating board between them so that the heat produced by the lower one could not have direct influence on the upper one (refer to the figure 3-3).

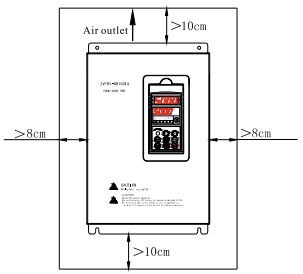


Figure 3-1 Demonstration of Installation Space

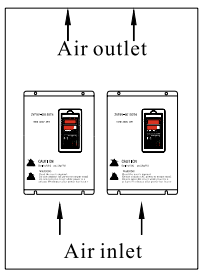


Figure 3-2 Demonstration of Multi-piece Parallel Installation

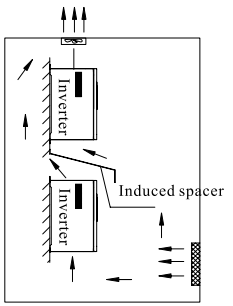


Figure 3-3 Demonstration of Multi-piece Vertical Installation

3.1.3 Installation Instructions

WARNING!

- Do not install or operate if the inverter is damaged or has parts missing to prevent injury to personnel or loss of property.
- Be sure the main loop terminals should be tightly connected to the cable. Otherwise, the inverter may be damaged arising from loose connection.
- Be sure the ground terminals of the inverter and the motor must be properly grounded. Multi-piece inverter should be grounded at one shared point.

COMPULSORY!

- Be sure to install a no-fuse circuit breaker or leakage protective circuit breaker in the side of inverter input power supply to prevent expanding of accident due to an inverter problem.

CAUTION!

- Install the inverter in a proper place with moderate temperature. The higher the ambient temperature is, the shorter the service life of the inverter is.
- Keep any other heat-producing equipment as far away from the inverter as possible. When installing the inverter in an enclosure, maintain the clearance around the inverter and verify the temperature is within the allowable range.

3.2 Parts Dismantling and Installation

3.2.1 Dismantle the upper cover.

1、Dismantle the upper cover of the inverter Model A.

Put a finger into the heave of the lower part of the inverter and press it (as shown in the figure 3-4 where the arrow points), stretch forward for 30~50mm (as shown in the figure 3-5), then raise upward to open the upper cover of the inverter.

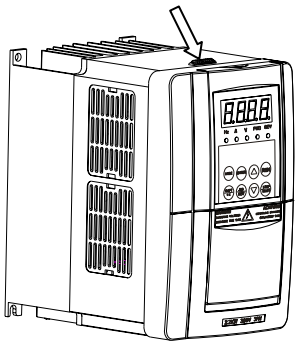


Fig. 3-4 Demonstration of dismantling the upper cover of the inverter Model A

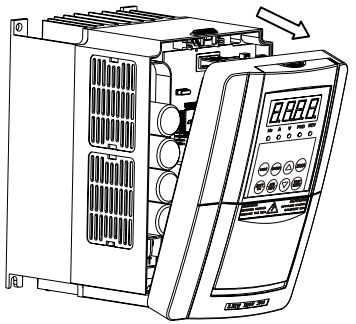


Fig. 3-5 Demonstration of dismantling the upper cover of the inverter Model A

2、Dismantle the upper cover of the inverter Model B.

Unscrew two screws of the lower part of the inverter (as shown in the figure 3-6 where the arrow points), pull the lower cover down for 10~20mm (as shown in the figure 3-7), then raise upward to open the lower cover of the inverter.

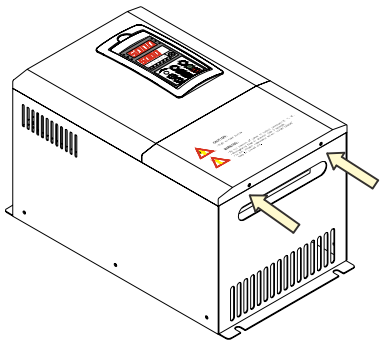


Fig. 3-6 Demonstration of dismantling the upper cover of the inverter Model B

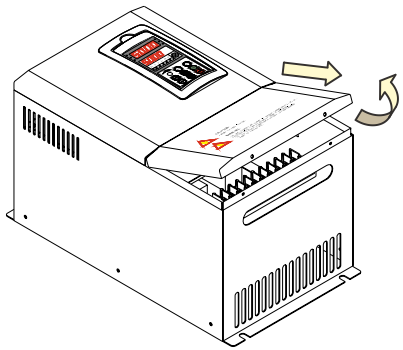


Fig. 3-7 Demonstration of dismantling the upper cover of the inverter Model B

3.2.2 Installation of the remote-controlled operator panel and connecting wire

1、Installation of the operator panel and connecting wire of the inverter Model A

Step 1. Button up with a hand at the notch of the upper part of operator panel and remove the operator panel (as shown in the figure 3-8).

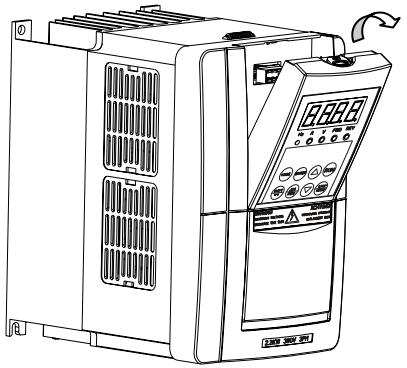


Fig. 3-8 Mounting Demonstration of the operator panel and connecting wire of the inverter Model A

Step 2. Fix the jack panel provided in the optional components in the installation position of operator panel (as shown in the figure 3-9).

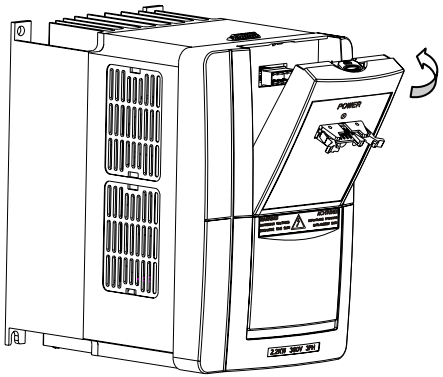


Fig. 3-9 Mounting Demonstration of the operator panel and connecting wire of the inverter Model A

Step 3. Plug the ground end of connecting wire provided in the optional components into the slot of jack panel (as shown in the figure 3-10).

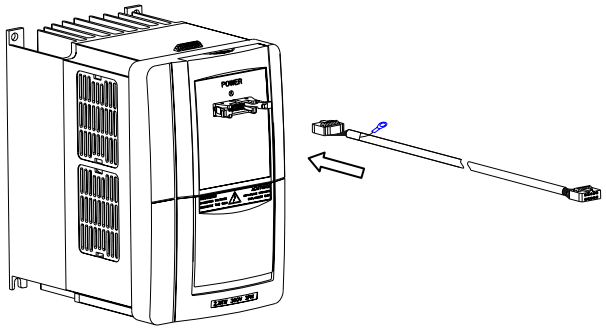


Fig. 3-10 Mounting Diagram for the operator panel and connecting wire of the inverter Model A

Step 4. Put the dismantled operator panel into the installation frame provided in the optional components, fix and fasten it. Plug the other end of connecting wire into the jack panel slot, then plug the slot into the operator panel (as shown in the figure 3-11).

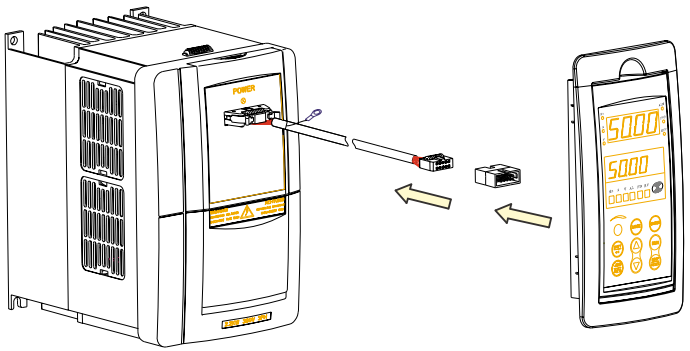


Fig. 3-11 Mounting Diagram for the operator panel and connecting wire of the inverter Model A

2、Installation of the operator panel and connecting wire of the inverter Model B

Step 1. Button up with a hand at the notch of the upper part of operator panel and remove the panel (as shown in the figure 3-12).

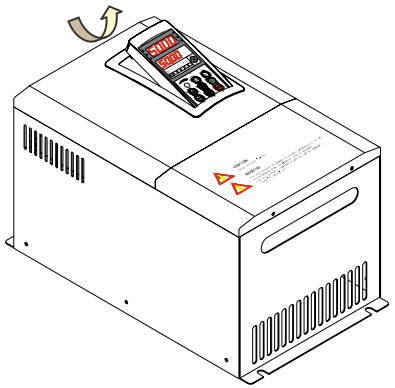


Fig. 3-12 Mounting Diagram for the operator panel and connecting wire of the inverter Model B

Step 2. Plug the connecting wires of the control panel and operator panel into the jack panel provided in the optional components, then fix the jack panel in the installing location of operator panel (as shown in Figure 3-13).

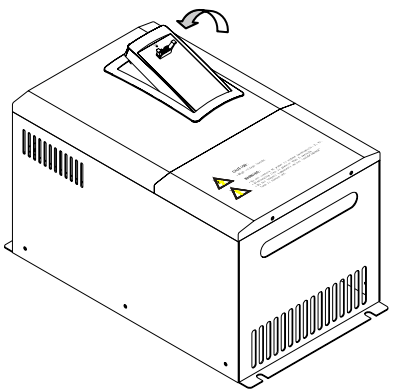


Fig. 3-13 Mounting Diagram for the operator panel and connecting wire of the inverter Model B

Step 3. Plug the grounding end of connecting wire into the slot of jack panel (as shown in the figure 3-14).

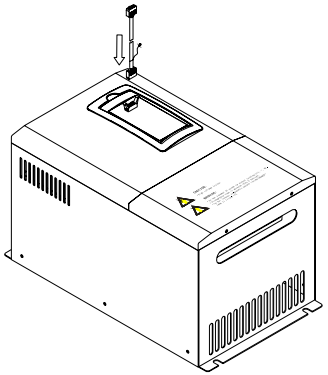


Fig. 3-14 Mounting Diagram for the operator panel and connecting wire of the inverter Model B

Step 4. Fix and fasten the dismantled operator panel, and put the other end of connecting wire into the socket of operator panel (as shown in the figure 3-15).

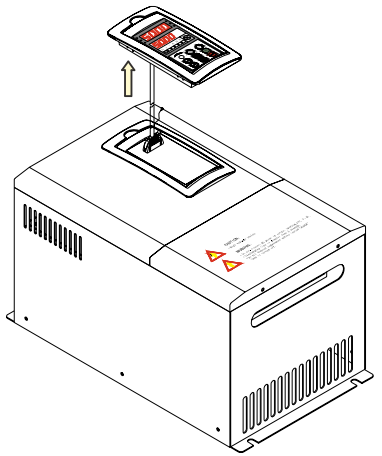


Fig. 3-15 Mounting Diagram for the operator panel and connecting wire of the inverter Model B

3.3 Inverter Wiring

3.3.1 Basic Wiring Diagram for the Inverter

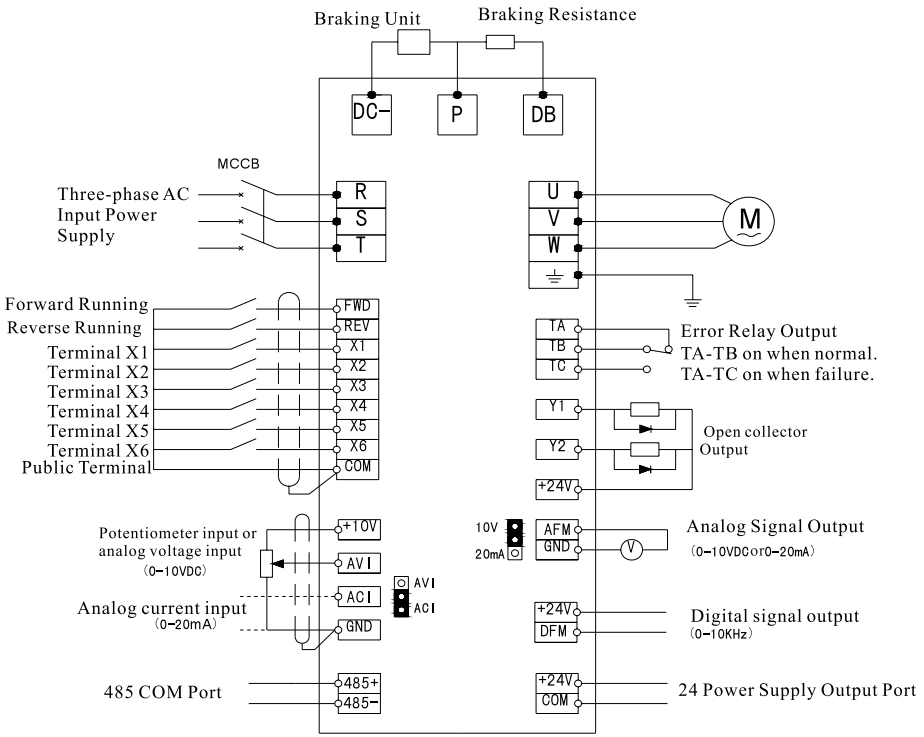


Fig.3-16 Basic Wiring Diagram

Applicable to Model： ZVF9V-G0007S2～G0037S2　　ZVF9V-G0007T2～G0075T2
ZVF9V-G0007T4～G0150T4　　ZVF9V-P0015T4～P0185T4

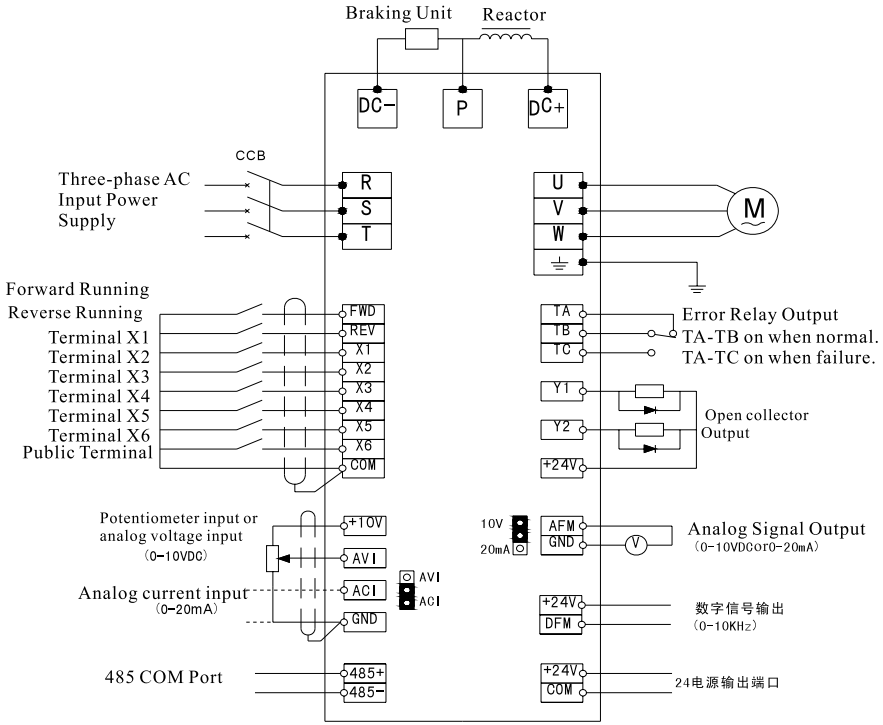


Fig.3-17 Basic Wiring Diagram

Applicable to Model ZVF9V-G0110T2～G0220T2　ZVF9V-G0185T4～G3750T4
ZVF9V-P0220T4～P4000T4

Tips

- The jumper JP3 is used to realize switching between the analog input voltage and current of plastic casing; JP2 is used to realize switching between analog output voltage and current.
- The jumper JP2 is used to realize switching between the analog input voltage and current of metal casing; JP1 is used to realize switching between analog output voltage and current.

3.3.2 Cautions for Wiring

Hazard!

- Wait at least 10 minutes after power OFF before opening the front cover of the inverter.
- Verify the charge indicator lamp is OFF before proceeding the work, and be sure that the voltage value of the main loop terminal P and DC is less than 36VDC.
- The internal wiring of the inverter should be operated only by authorized qualified personnel.

WARNING!

- Verify the rated input voltage of the inverter is matched with AC power supply. Otherwise, there is the possibility of damage to the inverter.
- Install in order and only operate wiring after finishing main parts installation. Otherwise, there is an electric shock or damage to the inverter.
- Do not perform over-voltage withstand to the inverter, for this had been done properly before EX-factory.
- Be sure to install a non-fuse circuit breaker in the input power supply side of the inverter to prevent expanding of accident due to an inverter problem, which may cause damage to the distribution equipment or lead to fire.
- Be sure to connect the ground terminal and the motor casing to the ground wire which must be copper core. The diameter of the copper core should conform to the relevant national standard. The ground resistance should be less than 10Ω.

FORBIDDEN!

- DO NOT connect AC power supply to the output terminals marked "U", "V" and "W". Otherwise, there will be damage to the inverter.
- DO NOT connect control terminals (except terminals marked "TA", "TB" and "TC") to AC 220V power supply, which may cause damage to the inverter.

Tips

- When the open-ended output terminal of the collector connects to any inductive load, i.e., the relay coil, do insert a diode at each end of the load in parallel.
- The control wire in the inverter or the control cabinet should be at least 100mm away from the power cable. DO NOT put them in the same metallic channel. If the signal wire and the power cable need to intersect, they should intersect at an angle of 90°. The control wire must adopt STP (shielded twisted pair wire); the shielded layer must connect to the terminal GND; and the power wire is recommended to use metallic shielded cable.

Tips

- The unavoidable strong electromagnetic interference of the inverter may have bad influence on all the electrical equipment and meters in the same environment. To reduce interference, the output cable of the inverter can be inserted in the metal pipe connecting to the ground or in the metallic shielded cable, and connect the metallic shielded layer to the ground. In addition, a magnetic loop put on the output cable is also effective to reduce interference.

3.3.3 Instruction on Main Circuit Terminals

1. The main circuit terminals are shown as in the figure 3-18~3-23.

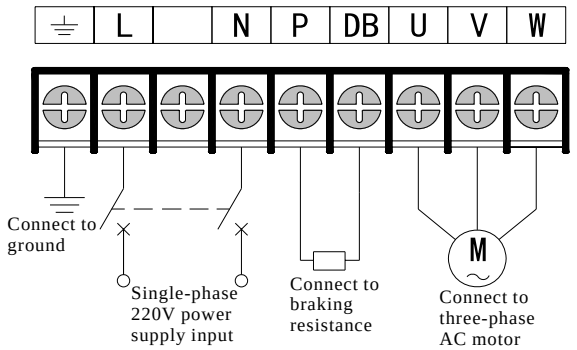


Fig.3-18 Diagram 1 for Main Circuit Terminals

Applicable to Model ：ZVF9V-G0007S2～G0037S2

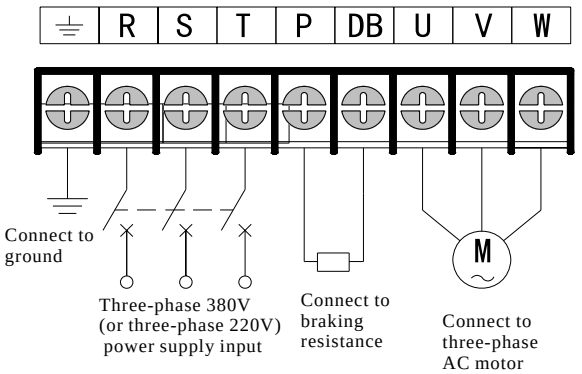


Fig.3-19 Diagram 2 for Main Circuit Terminals

Applicable to Model：ZVF9V-G0007T2～G0075T2，ZVF9V-G0007T4～G0110T4 ZVF9V-P0015T4～P0150T4

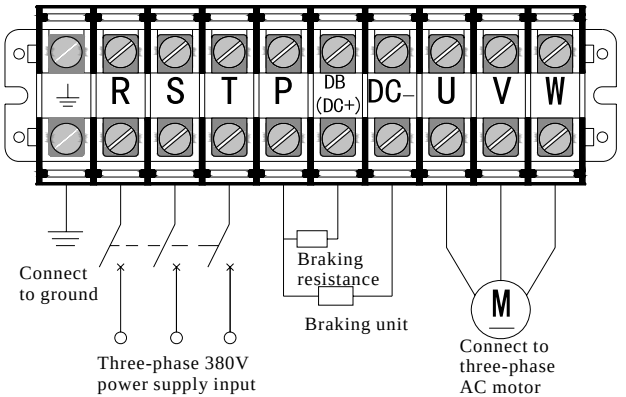


Fig.3-20 Diagram 3 for Main Circuit Terminals

Applicable to Model：ZVF9V-G0110T2～G0150T2，ZVF9V-G0150T4～G0300T4 ZVF9V-P0185T4～P0370T4

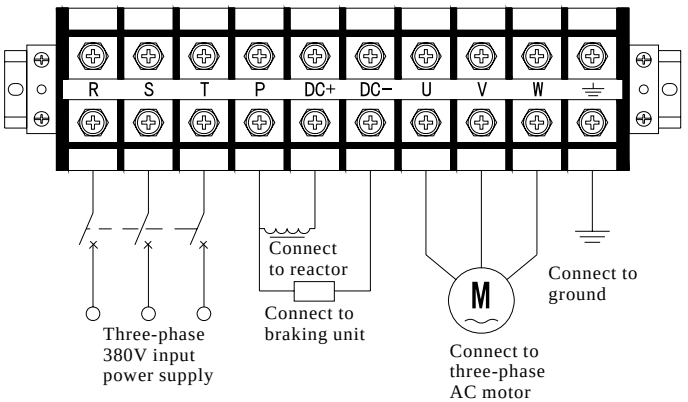


Fig.3-21 Diagram 4 for Main Circuit Terminals

Applicable to Model：ZVF9V-G0185T2～G0220T2，ZVF9V-G0370T4～G1100T4 ZVF9V-P0450T4～P1320T4

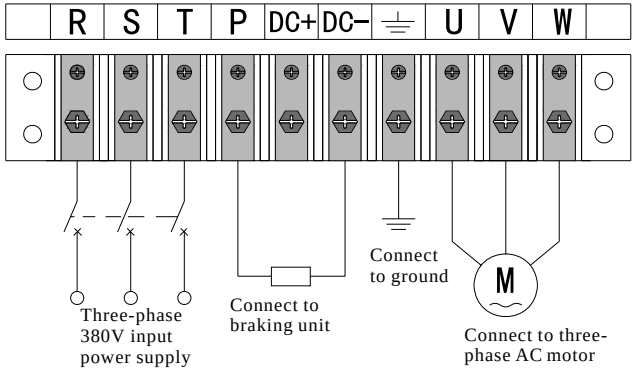


Fig.3-22 Diagram 5 for Main Circuit Terminals

Applicable to Model：ZVF9V-G1320T4～G1850T4，ZVF9V-P1600T4～P2000T4

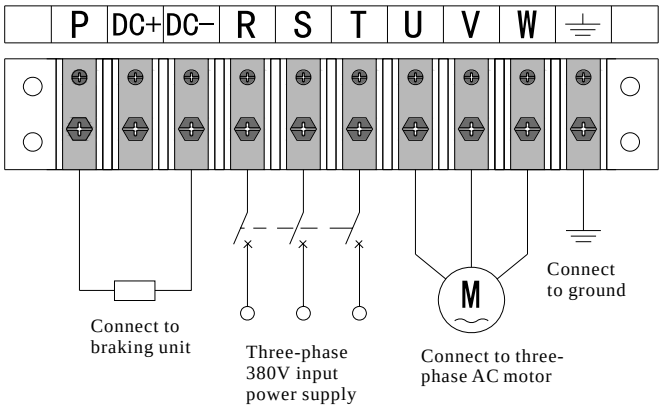


Fig.3-23 Diagram 6 for Main Circuit Terminals

Applicable to Model：ZVF9V-G2000T4～G3750T4，ZVF9V-P2200T4～P4000T4

2、Function Description on Main Circuit Terminals

Terminal Symbols	Function Description
R、S、T	Power supply input terminals connecting to three-phase 380V or 220V AC input power supply
L、N	Power supply input terminals connecting to single-phase 220V AC input power supply
U、V、W	Inverter output terminals connecting to three-phase AC motor
P、DB	External braking resistance terminals connecting to both ends of the external braking resistance
P、DC-	External braking unit terminals; terminal P connects to the positive end of the braking unit and DC- connects to the negative end.
P、DC+	External AC reactor terminals connecting to both ends of the AC reactor
⏚G	Ground terminal connecting to the ground

Tips

- The three-phase input power supply terminals (R, S and T) do not differ on phase sequence and can be connected arbitrarily.
- If the motor counter rotates (reverses) when the output terminals U, V and W connect to three-phase motor, just exchange two phases of U, V and W arbitrarily.
- A braking unit is required to be installed inside the inverter under 15KW. If an external braking resistance is required, just connect to the external braking resistance between terminal P and terminal DB.
- An inverter higher than 18.5KW has no internal braking unit, so it has no DB terminal. If a braking torque is needed, please connect to the external brake assembly（including braking unit and braking resistance） between P and DC-.
- ZVF9V-G1600T4/P1850T4 or even updated model is matched with DC reactor. If an inverter has no internal DC reactor, just fix a DC reactor between P and DC+. When performing this step, it is required to remove the short-circuit ring, then connect to the reactor (applicable to the inverter of 18.5KW or higher power).

3.3.4 Description on Control Circuit Terminals

1、Control circuit terminals are shown in the figure 3-24 and 3-25

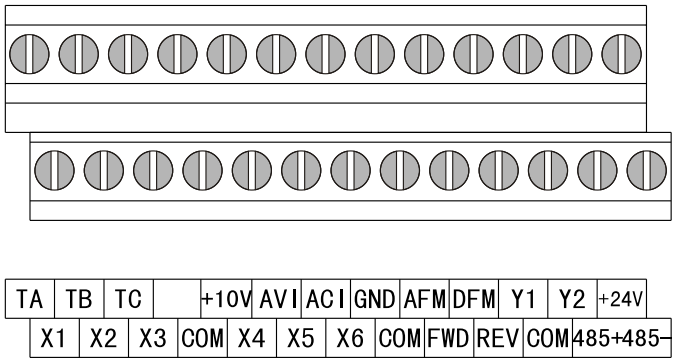


Fig.3-24 Control Circuit Terminals (1)

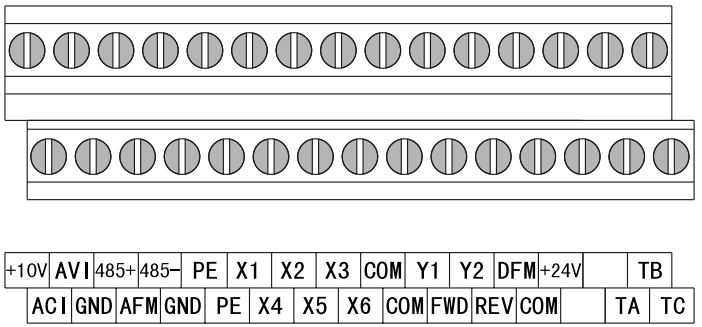


Fig.3-25 Control Circuit Terminals (2)

2、Description on Control Circuit Terminals

Table 3-2 Function Description on Control Circuit Terminals

Types	Terminal Symbols	Function Description	Electrical Specifications
Public Port	COM	Digital signal public terminal	
Running Control Terminal	FWD	Forward when FWD-COM shortcuts, decelerate and stop when FWD-COM is open.	INPUT, 0~24V power level, low level valid, 5mA
	REV	Reverse when FWD-COM shortcuts, decelerate and stop when FWD-COM is open.	
Multi-function Input Terminal	X1	Valid only when there is a short circuit between Xn (n=1, 2, 3, 4, 5, 6) and COM. The functions can be set by the parameter F4.00~F4.05 separately.	INPUT, 0~24V power level, low level valid, 5mA
	X2		
	X3		
	X4		
	X5		
	X6		
Multi-function Output Terminal	Y1	Multi-function open-collector output is defined as on-off output terminal, whose function is set by the parameter F4.07~F4.08 with reference of COM.	OUTPUT, Maximum Current Load I ≤50mA
	Y2		
Others	PE	Ground Terminal	
	NC	Vacant Terminal	

Types	Terminal Symbols	Function Description	Electrical Specifications
Public Port	GND	Analog signal public terminal	
Analog Input Terminal	+10V	External analog preset power supply connecting to potentiometer together with terminal GND and AVI. The frequency can be set as required.	INPUT, 10V DC voltage
	AVI	Analog voltage signal input, with reference of GND.	INPUT, 0~10V DC voltage
	ACI	Analog current signal input, with reference of GND	INPUT, 0~20mA DC current
Analog Output Terminal	AFM	Programmable analog voltage output connecting to the voltmeter or frequency meter with corresponding output ranging from "0" to the maximum frequency, with reference of GND.	OUTPUT, 0~10V DC voltage or 0~20mA DC current
Power supply Interface	+24V	24VDC Power Supply Output (Control Power Supply)	24VDC-100mA
Digital Output Terminal	DFM	Programmable digital signal output connecting to the frequency meter with corresponding output ranging from "0" to the maximum frequency, with reference of GND.	OUTPUT, 0~10KHz impulse output
Programmable Output Terminal	TA	Relay contact output. When normal, TA-TB turns on and TA-TC turns off. When there is action, TA-TB turns off and TA-TC turns on. This function is set by F4.09.	Contact rated value: 250VAC-3A 250VAC-1A 30VDC-1A
	TB		
	TC		

3.4 Wiring Diagram for Inverter System

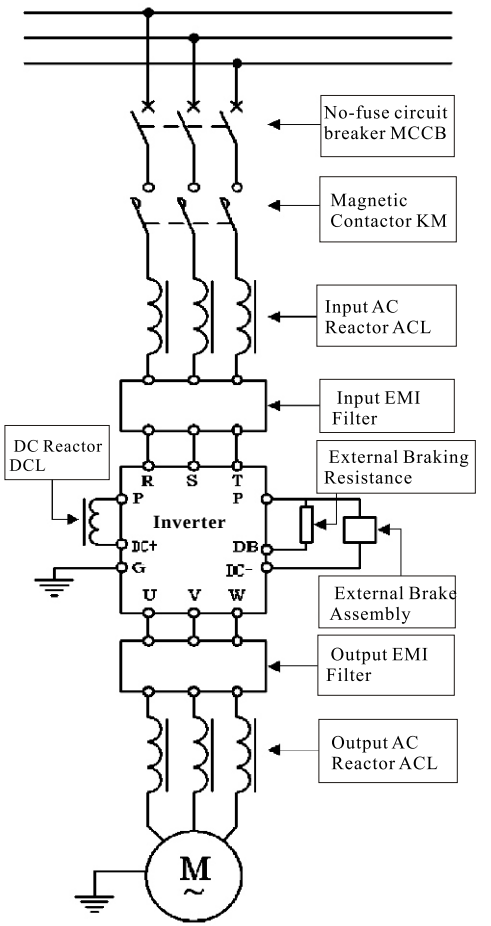


Fig.3-26 Connection between the Inverter and Optional Accessories

Tips

• The circuit breaker has the function of over-current protection, which can avoid extension of external equipment failure. Do pay attention to the capacity of circuit breaker when installing. Refer to Table 3-3 to select the circuit breaker.

• The magnetic contactor is used to disconnect from the main power supply in case of inverter failure, and prevent restarting after power-off or inverter failure.

• The input AC reactor can reduce influence arising from unbalance of three-phase AC power supply, improve the power factor of the inverter input side and reduce damage to the inverter when it is connected to large capacity motor which may result in damage to the rectifier circuit. It is necessary to configure an AC reactor when any of the following occurred:
① The power supply unbalance exceeds 3%.
② The power capacity is 500KVA at least and it is more than 10 times as the inverter capacity.
③ The power factor is used to compensate the connection or disconnection of the capacity, and sudden fluctuation of network voltage caused by other reasons.
It is recommended to install a reactor with derating voltage of 3%.

• The input and output EMI filters are used to minimize the magnetic or radio frequency interference (RFI) produced by the network or the inverter.

• The brake assembly is used to consume the energy fed back by some heavy potential energy or inertia load to the inverter, so as to avoid inverter tripping arising from over-tension pumping voltage while giving a quick shutdown to the inverter.

• The output AC reactor can filter out with effect the higher harmonic components in the inverter output current and reduce the electromagnetic interference (EMI) due to ultra harmonics. Also, it can improve current waveform, decrease noise and temperature rise of a running motor and enhance the stability of motor running. To avoid influence of leakage current due to distributed capacity of the cable, it is necessary to install an output AC reactor if the motor cable is longer.

Table 3-3 Capacity of Break Switch & Section Area of Wire

Inverter Models	Break Switch (A)	Main Circuit (mm^2)		Control Wire (mm^2)
		Input Wire	Output Wire	
ZVF9V-G0007T2/S2	10	2.5	2.5	0.75
ZVF9V-G0015T2/S2	16	2.5	2.5	0.75
ZVF9V-G0022T2/S2	20	4	4	0.75
ZVF9V-G0037T2/S2	32	6	6	0.75
ZVF9V-G0055T2	50	10	10	0.75
ZVF9V-G0075T2	63	10	10	0.75
ZVF9V-G0110T2	100	16	16	0.75
ZVF9V-G0150T2	125	25	25	0.75
ZVF9V-G0185T2	160	35	35	0.75
ZVF9V-G0220T2	200	35	35	0.75
ZVF9V-G0007T4	5	2.5	2.5	0.75
ZVF9V-G0015T4/P0015T4	10	2.5	2.5	0.75
ZVF9V-G0022T4/P0022T4	10	2.5	2.5	0.75
ZVF9V-G0037T4/P0037T4	20	4	4	0.75
ZVF9V-G0040T4/P0040T4	20	4	4	0.75
ZVF9V-G0055T4/P0055T4	30	4	4	0.75
ZVF9V-G0075T4/P0075T4	40	6	6	0.75
ZVF9V-G0110T4/P0110T4	50	10	10	0.75
ZVF9V-G0150T4/P0150T4	63	10	10	0.75
ZVF9V-G0185T4/P0185T4	100	10	10	0.75
ZVF9V-G0220T4/P0220T4	100	16	16	0.75
ZVF9V-G0300T4/P0300T4	125	25	25	0.75

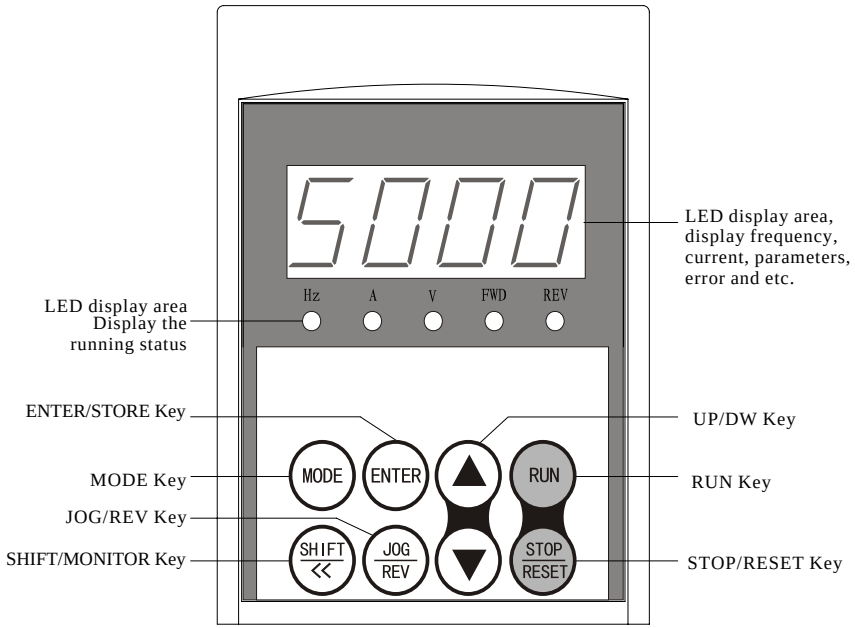
Inverter Models	Break Switch (A)	Main Circuit (mm²)		Control Wire (mm²)
		Input Wire	Output Wire	
ZVF9V-G0370T4/P0370T4	160	35	35	0.75
ZVF9V-G0450T4/P0450T4	200	35	35	0.75
ZVF9V-G0550T4/P0550T4	200	50	50	0.75
ZVF9V-G0750T4/P0750T4	250	50	50	0.75
ZVF9V-G0900T4/P0900T4	315	70	70	0.75
ZVF9V-G1100T4/P1100T4	400	95	95	0.75
ZVF9V-G1320T4/P1320T4	400	95	95	0.75
ZVF9V-G1600T4/P1600T4	630	120	120	0.75
ZVF9V-G1850T4/P1850T4	630	120	120	0.75
ZVF9V-G2000T4/P2000T4	630	185	185	0.75
ZVF9V-G2200T4/P2200T4	800	240	240	0.75
ZVF9V-G2500T4/P2500T4	800	300	300	0.75
ZVF9V-G2800T4/P2800T4	1000	300	300	0.75
ZVF9V-G3150T4/P3150T4	1200	185×2	185×2	0.75
ZVF9V-G3500T4/P3500T4	1250	240×2	240×2	0.75
ZVF9V-G3750T4/P3750T4	1600	300×2	300×2	0.75
ZVF9V-P4000T4	1600	300×2	300×2	0.75

Chapter 4 Operator panel and its Operation

4.1 Operator Panel and Description

The inverter ZVF9V series has 2 kinds of operator panels, with potentiometer or without potentiometer. The standard model does not have a potentiometer before EX-factory. If a user needs an inverter with a potentiometer, he should tell the manufacturer in advance.

4.1.1 Operator Panel Outlay



Applicable to Model: ZVF9V-G0007T4～G0110T4, ZVF9V-P0015T4～P0150T4
ZVF9V-G0007T2/S2～G0075T2

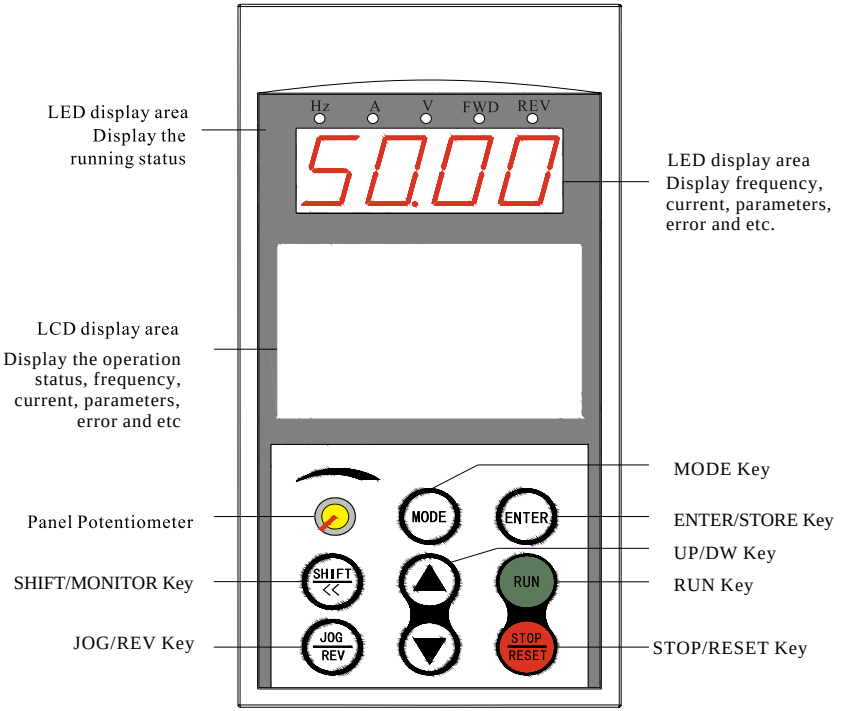


Fig.4-2 Diagram for ZR05 Operator Panel

Applicable to Model:ZVF9V-G0150T4～G3750T4，ZVF9V-P0185T4～P4000T4

ZVF9V-G0110T2～G0220T2

4.1.2 Function Description on Keys

RUN	• Run key. When the operating instruction is to select operator panel control (F0.04=0), press this key and the inverter begins to run.
STOP RESET	• Stop/Reset key. When the operating instruction is to select operator panel control (F0.04=0), the inverter is in normal running. Press this key to stop running. When the inverter is in the state of failure alarming, press this key to solve failure and return to the normal status.
MODE	• Mode shifting key. Press this key to realize mode switching from monitoring parameter to function parameter.
ENTER	• Enter/Store key. Press this key to confirm the current status of the inverter or save the current parameter value.
JOG REV	• Jog/Reverse key. Press this key to realize jog or reserve function, and decide jog or reverse function by selecting the parameter F0.23. The factory default setting is jog function.
SHIFT <<	• Shift/Monitor key. When a data needs modifying, press this key to select the modifier bit of the data. In the status of monitoring, press this key to display the status parameter.
▲	• Up key. Press this key, the data or parameter code will go up. Press and hold it, the modifying speed upward will rise.
▼	• Down key. Press this key, the data or parameter code will go down. Press and hold it, the modifying speed downward will rise.

4.1.3 Function Description on Operator Panel Indicator Lights

Table 4-1 LED Status Description

Display Status	Function Description
● Hz	• When this indicator light is switched ON, LED displays frequency data.
● A	• When this indicator light is switched ON, LED displays current data.
● V	• When this indicator light is switched ON, LED displays voltage data.
● FWD	• When this indicator light is switched ON, the inverter is in the state of forward running.
● REV	• When the indicator lights is switched ON, the inverter is in the state of reverse running.
●●Hz&A	• When these 2 indicator lights are switched ON simultaneously, the rotary speed will be displayed.
●●Hz&V	• When these 2 indicator lights are switched ON simultaneously, the percentage will be displayed.
●●A&V	• When these 2 indicator lights are switched ON simultaneously, the linear speed will be displayed.
●●●Hz&A&V	• When these 3 indicator lights are switched ON simultaneously, temperature will be displayed.

4.1.4 Working mode and display status of the function keyboard

1. Mode of Monitoring State
Press "MODE" key, the inverter enters into the monitoring state mode (LED displays Fd□□). Under this mode, press ▲/▼ to decide what to be monitored (i.e., a running parameter or failure record).

2. Mode of Function Status
Repress "MODE" key, the inverter will enter the mode of function status (LED displays F□.□□). Under this mode, press ▲/▼ or plus "SHIFT" key to decide the function parameter to be checked or modified.

3. Power On/Off Display
The LED displays P.oFF when the inverter is just powered on or powered off properly.

• In any event, the operator panel will automatically return to the Monitoring Mode if there is no key entry in 2 continuous minutes.
• In the mode of monitoring, the frequency value will be modified by pressing ▲/▼ on the operator panel when setting F0.01=1.

4、The correspondence between display symbols of the parameter Fd14 and external input terminal status in the monitoring mode is shown below:

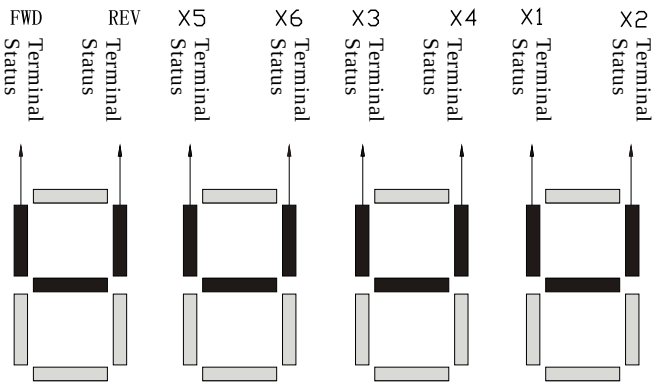


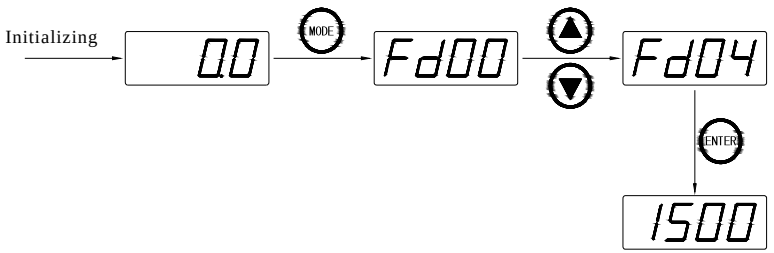
Fig. 4-3 Relationship between input terminal status and display symbols in monitoring mode

■ : Terminal turns ON, valid input of terminal

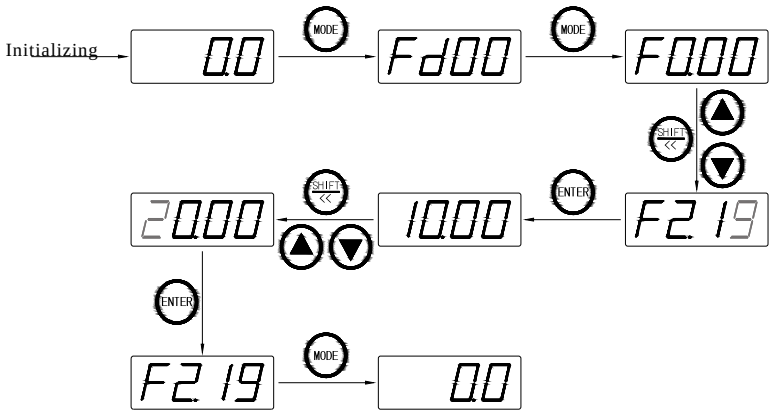
□ : Terminal turns OFF, invalid input of terminal

4.1.5 Use of Operator Panel

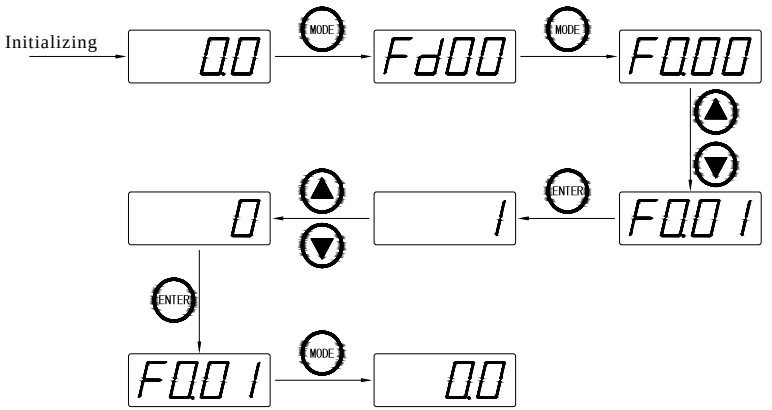
① Parameter modification in the monitoring status
(modify the motor rotating speed from Fd00 to Fd04).



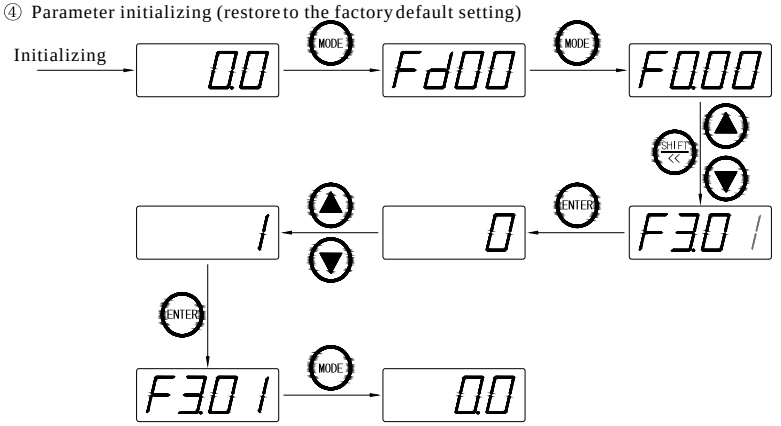
② Modification of parameter value for function codes
(modify the parameter value for F2.19 jog function from 10.00Hz to 20.00Hz).



③ Modification of parameter value for function codes (modify the parameter value for F0.01 frequency setting mode from 1 to 0)



④ Parameter initializing (restore to the factory default setting)



TIP

0 indicates the digital tube is flickering;

0 indicates the digital tube is not flickering.

4.2 Monitoring Parameter Display

Table 4-2 Monitoring Parameter LED Display List

Category	Display Code	Name	Unit
Monitoring Display Parameters	Fd00	Output frequency	Hz
	Fd01	Setting frequency	Hz
	Fd02	Output current	A
	Fd03	Output voltage	V
	Fd04	Motor rotation speed	r/min
	Fd05	Running linear speed	m/s
	Fd06	Setting linear speed	m/s
	Fd07	DC bus bar voltage	V
	Fd08	Input voltage	V
	Fd09	PID set value	
	Fd10	PID feedback value	
	Fd11	Analog input AVI	V
	Fd12	Analog input ACI	A
	Fd13	Impulse input frequency	KHz
	Fd14	Input terminal status	
	Fd15	Radiator temperature	℃
	Fd16	Module temperature	℃
	Fd17	Current counter value	
	Fd18	Setting counter value	

Category	Display Code	Name		Unit
Monitoring Display Parameters	Fd19	1st diagnostic failure codes	0:OC-1 Acceleration running over current 1:OC-2 Deceleration running over current 2:OC-3 Steady-speed running over current 3:OU-1 Acceleration running over voltage 4:OU-2 Deceleration running over voltage 5:OU-3 Steady running over voltage 6:OU-4 Over voltage when power off 7:LU Under voltage of running 8:LP Input side open-phase 9:SC Power module failure 10:OH Radiator over heat 11:OL Inverter overload 12:OL Motor overload 13:EF external equipment failure 14:CE-1 COM error 15:CE-2 Remain 16:CE-3 Current detection error 17:CE-4 Keyboard communication failure 18:CPU failure	
	Fd20	2nd diagnostic failure codes		
	Fd21	3rd diagnostic failure codes		
	Fd22	Output frequency of the last failure		Hz
	Fd23	Setting frequency of the last failure		Hz
	Fd24	Output current of the last failure		A
	Fd25	Output voltage of the last failure		V
	Fd26	DC bus bar voltage of the last failure		V
	Fd27	Module temperature of the last failure		℃
	Fd28	Software edition		

4.3 Failure Parameters Display

Table 4-3 Trouble Codes LCD Display List

Category	Display Code	Failure Name
Failure Codes	OC-1	Acceleration running over current
	OC-2	Deceleration running over current
	OC-3	Steady-speed running over current
	OU-1	Acceleration running over voltage
	OU-2	Deceleration running over voltage
	OU-3	Steady running over voltage
	OU-4	Over voltage when power off
	LU	Under voltage of running
	LP	Input side open-phase
	SC	Power module failure
	OH	Radiator over heat
	OL-1	Inverter overload
	OL-2	Motor overload
	EF	external equipment failure
	CE-1	COM error
	CE-2	Remain
	CE-3	Current detection error
	CE-4	Keyboard communication failure
	CPU	CPU failure

Chapter 5 Operation of Inverter

5.1 Trial Operation

5.1.1 Safety Instruction on Trial Operation

HAZARD

• Never open the front cover while the inverter is switched ON. Otherwise, there is the danger of electric shock.
• Never touch the inner side of the inverter while it is power ON, nor put any foreign matter, i.e., rod or other matter inside the inverter. Otherwise, it may result in serious damage to the equipment or death to personnel.

CAUTION

• Motor insulation should be checked before the inverter is used for the first time or reused after a long-term idle. Be sure the insulation resistance measured is no lower than 5MΩ.
• An inverter stored for a year or longer must be given power up test before use, so that the main circuit filtering capacity of the inverter could be recovered. Do raise the voltage gradually by using a voltage regulator to some rated value before it is recharged. Generally, the recharging period lasts 1~2 hours. Otherwise, there is the danger of electric shock or exposure.

5.1.2 Check before trial operation

The following steps should be inspected and confirmed before the trial operation of the inverter:
• Be sure the application ambient and installation for the inverter is in accordance with the requirements specified in Clause 3.1.
• Be sure the main circuit is correctly wired. The input power supply of the inverter must be connected to the terminal R, S and T. The output terminal U, V and W must be connected to the motor.
• Be sure the ground terminal is reliably and properly grounded.
• Be sure all the switches and terminals are in proper state of off or shutdown.
• Be sure there is no short cutting or short to ground of all the terminals and electrified parts.
• Be sure all the terminals, connectors and screws are tightly fastened.
• Be sure the motor has no other loads.

5.1.3 Trial Operation

Try this step only after careful inspection as mentioned in the clause 5.1.2. While in trial operation, it is suggested that the motor has vacant load to avoid damage to this mechanical equipment arising from incorrect operation. During trial operation, if the operating instruction is F0.04, then the RUN/STOP key control (factory default setting) of the operator panel must be selected. The trial operation steps must be followed as shown in the table 5-1 below.

Table 5-1 Trial Operation Steps

Order	Operation	Description
1	Switch on, inverter energized.	When energized, the inverter is in the state of readiness and LED displays 0.00Hz.
2	Press ▲/▼ till LED displays 5.00Hz.	Set the frequency to 5.00Hz. This step can be left out if the displayed frequency is already 5.00Hz when energized.
3	Press RUN.	Motor begins rotating, the frequency displayed on the inverter LED raises from 0.00Hz to 5.00Hz, and the built-in cooling fan begins working.
4	Keep a close eye on the following points: ①if there is any abnormal vibration or noise when the motor runs. ②if there is any tripping or other abnormality of the inverter. ③If the motor runs in the correct direction. ④if the value for rotation speed and frequency is correct.	If there is any anomaly or tripping, stop running immediately and cut off the power supply. Please refer to Chapter 7, find the trouble causes, then proceed trial operation again after troubleshooting. If the motor runs in the wrong direction, change arbitrary two-phase connection of the output terminal U, V or W. Go to the next step if everything is normal.
5	Press ▲ continuously till LED displays 50.00Hz.	The motor accelerates rotating and the displayed frequency rises from 5.00Hz to 50.00Hz. Go to the next step if everything is normal.
6	Press ▼ continuously till LED displays 0.00Hz.	The motor decelerates rotating and the displayed frequency falls from 50.00Hz to 0.00 Hz. Go to the next step if everything is normal.
7	Press STOP.	The inverter stops outputting, the motor stops running and the trial operation ends. If everything is normal, please repeat the operation for several times.

5.2 Cautions for Operation

All the inverter functions are determined by set parameters. The parameters of inverter ZVF9V series consist of the function codes F0.00~FA.12, see the detail in Chapter 6 of this manual. The displayed parameter value of each function code is the factory default value of the inverter before EX factory, which can be modified by the user according to his needs. It is noteworthy that a user shall change the relative function parameters when he amends a parameter because some of the parameters are inter-related. It is not recommended to modify the set parameter value if there is no special requirement, for the factory default setting has been done properly. Otherwise, this may cause damage to the inverter or equipment due to error parameter.
In case there is an error alternation of the parameter, please initialize the parameter with reference to the operation method in the clause ***4.1.5***④ Parameter Initializing（***Restoring Factory Default Settings***）.

HAZARD

• Do not open the front cover while the inverter is powered ON. Otherwise, there is the danger of electric shock.
• Do not touch the inner side of the inverter while the power is ON, nor put any foreign matter, i.e., rod or other matter inside the inverter. Otherwise, it may result in serious damage to the equipment or death to personnel.
• Do not operate the inverter with wet hands.
• If Retry Mode is set, please put a warning sign like "KEEP CLEAR" or "HAZARD" in an eye-catching place before the equipment to avoid sudden restart of the equipment after a trip stop that may result in injury to personnel.

WARNING

• If the inverter runs at a frequency higher than 50Hz, DO confirm it is within the speed range acceptable by your motor bearing and mechanical device. Otherwise, there is the danger of damage to the motor.
• Derating should be done before use due to less effective of heat dissipation when a general motor runs at a low frequency. If it is a constant torque load, then a forced method or a special variable frequency motor should be used to release heat.
• DO cut off the power supply of an inverter set aside for a long time to avoid foreign matter or other things enter in it which may cause damage to the inverter or even lead to fire.

CAUTION

• If the inverter is used beyond the range of allowable working voltage, then an extra step-up or step-down voltage transformer shall be configured.
• Due to thin air in a place where the altitude is higher than 1,000m, heat dissipation of the inverter will be less effective. Hence derating should be performed before use. In general, when the height rises by 1,000m, the rated voltage of the inverter shall be reduced by 10%. Refer to Fig. 5-1 for details of the derating curve.

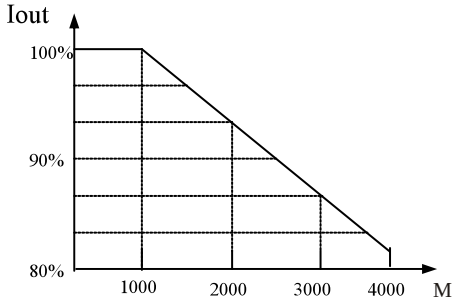


Fig. 5-1 Diagram for Inverter Derating Curve

FORBIDDEN

• DO NOT touch the radiator or charging resistor of the inverter with hand(s). Otherwise, there is the possibility of getting scalded.
• DO NOT proceed direct start-stop operation frequently with a contactor or any other switch devices in the inverter input side. As large charging current exists in the main circuit of the inverter, frequent power-on/off may produce cumulative effect resulting in heat fatigue of inverter components and great reduction of service life of the inverter.

COMPULSORY

• In case abnormalities occur, such as smoke, off odor, strange sound and so on, DO cut off the power supply immediately, overhaul the equipment or turn to the agent for help via phone call.

5.3 Examples of Use

This manual provides the following examples for users' reference on the use of inverter.

5.3.1 Eg. 1: Run or stop the inverter with operator panel, and feed the frequency with operator panel potentiometer.

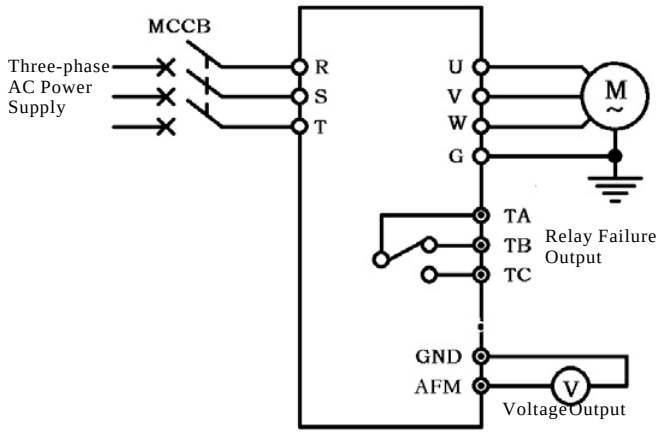


Fig. 5-2 Eg.1 Wiring Diagram

• F0.01—This indicates the selection of frequency setting. If setting this value to "0", the frequency will be fed by the potentiometer.
• F0.04—This indicates the selection of operating instruction. If setting this value to "0", the inverter will be controlled by the operator panel.
• Run or stop the inverter with RUN or STOP/RESET keys on the operator panel.
• Rotate the operator panel potentiometer to adjust the speed.

5.3.2Eg.2: Run or stop the inverter with external terminals, and feed the frequency with external potentiometer.

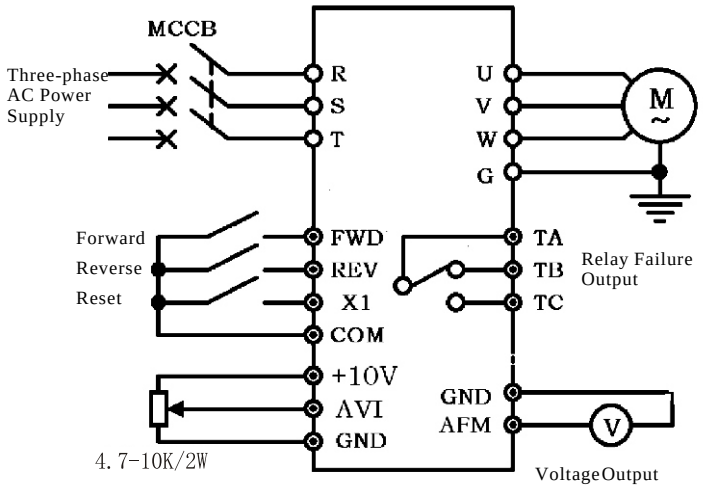


Fig. 5-3 Eg.2 Wiring Diagram

• F0.01—This indicates the selection of frequency setting. If setting this value to "4", the frequency will be set by external voltage signal AVI or external potentiometer.
• F0.04—This indicates the selection of operating instruction. If setting this value to "1", the inverter will be controlled by external terminals.
• F4.00—This indicates the selection of the function of input terminal X1. If setting this value to "20", then the external reset input is performed.
• FWD-COM on, motor forwards. REV-COM on, motor reverses. FWD, REV-COM on or off at the same time, inverter stops running. X1-COM on, failure resets.
• Realize speed control by regulating the value of "AVI" (controlled by 4.7~10K/2W potentiometer).

5.3.3 Eg.3: Run or stop the inverter with external terminals by adopting operation manner at multistage speed.

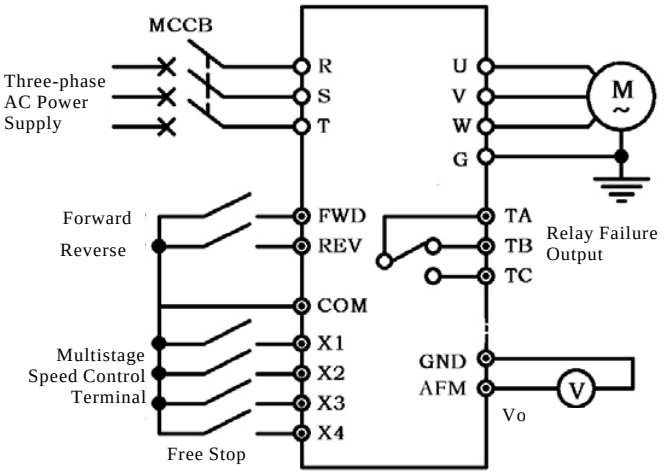


Fig. 5-4 Eg.3 Wiring Diagram

• F0.04—This indicates the selection of operating instruction. If setting this value to "1", the inverter will be controlled by external terminals.
• F4.00~F4.02—This indicates the selection of multi-function terminal X1~X3, set to 1, 2 and 3 multistage speed control terminal in order.
• F4.03—(X4 multi-function selection). Select 11---External free stop.
• F2.28~F2.34—Multi-speed frequency setting, which can be set into 7 stages. Factory defaults are preferred.
• FWD—COM on, motor forwards; REV-COM on, motor reverses.
FWD、REV—COM on/close or off/open simultaneously, inverter stops.
• Connecting an arbitrary terminal of X1~X3 to COM (7 pairs of such complex in total), the inverter will run at the frequency of multistage speed selected by X1~X3.

5.3.4Eg.4: Run or stop the inverter with external terminals, and feed the frequency with external potentiometer and multiple motors run in parallel..

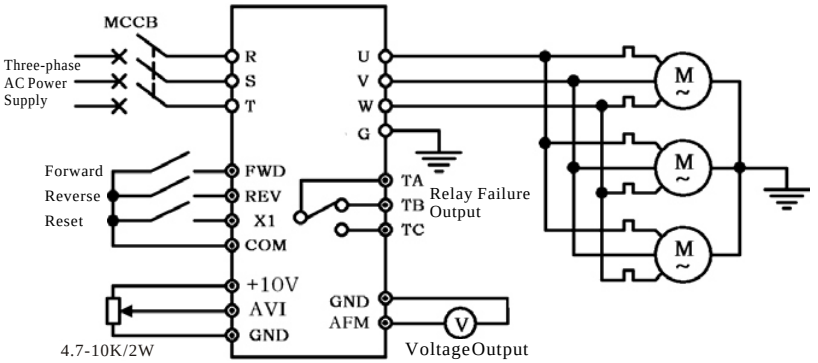


Fig. 5-5 Eg.4 Wiring Diagram

• F0.01— This indicates the selection of frequency setting. If setting this value to "4", the frequency will be set by external voltage signal AVI or external potentiometer.
• F0.04—This indicates the selection of operating instruction. If setting this value to "1", the inverter will be controlled by external terminals.
• F4.00—This indicates the selection of the function of input terminal X1. If setting this value to "20", external reset input is performed.
• FWD-COM close, motor forwards. REV-COM close, motor reverses. FWD, REV-COM close or open simultaneously, inverter stops running..
X1-COM close, failure resets.
• Realize speed control by regulating the value for "AVI" (controlled by 4.7~10K/2W potentiometer).
• Each set of motor uses thermal relay to have an overload protection.
• The value for electronic thermal relay is determined by the parameter F9.00 through tests.

5.3.5 Eg.5: Multiple Inverter Ratio Interlocking Operation Control

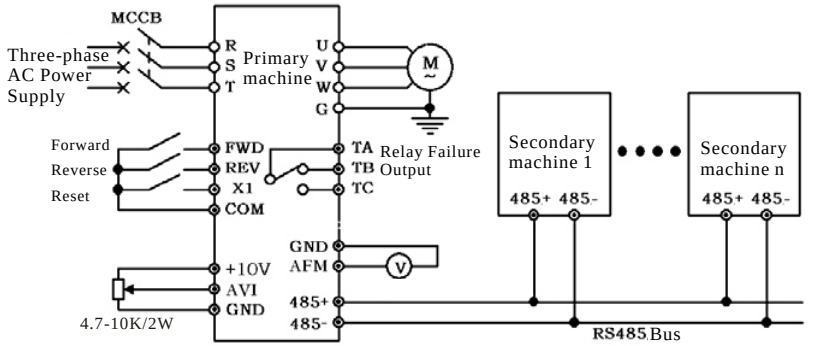


Fig. 5-6 Eg.5 Wiring Diagram

Primary Machine Setting
• F8.00Local communication address: Set this address to 0 and make the inverter as a host.
• F8.01Communication configure: Set all the data formats of the inverter to the same value.
Secondary Machine Setting
• F0.01Selection of frequency setting: Set this value to 3, the frequency will be set by COM (serial communication).
• F0.04—Selection of operating instruction: Set this value to "2", the inverter will be controlled by COM.
• F8.00Local communication address: Set this address to 1~30, which means 30 sets of inverters can be connected at this address maximally).
• F8.01Communication configure: Remain the same as the primary machine.
• F8.02Communication timed-out checkout time: Remain the same as the primary machine.
• F8.03Local response delay: Remain the same as the primary machine
• F8.04Interlocking setting ratio: 0.01~10.00, set as per user's demand.
• Only such operations can be done on the master inverter, such as start, stop and so the like. Other operations should be matched with the master inverter.

5.3.6 Eg.6: PID Constant Pressure Water Supply Control

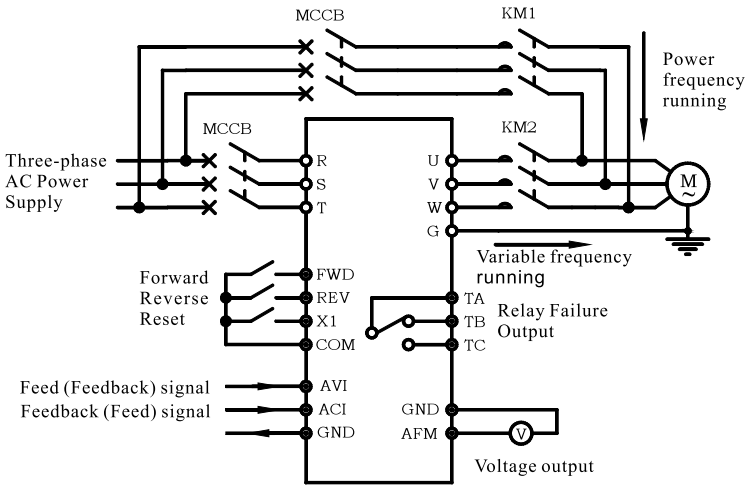


Fig. 5-7 Eg.6 Wiring Diagram

• F6.00PID motion selection: Set the value to 01, then PID selection is valid.
• F6.01PID given path selection: Set the value to 1, digital feed is selected.
• F6.02PID Feedback path selection: Set the value to 1, then external current is selected.
• F6.03Given digital setting: Set according to actual demand. Set it to 5.0V herein.
• F6.04PID Feedback flow gain: Set according to actual demand. No regulation here.
• F6.05PID feedback polarity selection: Set the value to 0, then positive is selected.
• F6.06Proportional gain P: Set according to actual demand. No regulation here.
• F6.07Integral time constant TI: Set according to actual demand. No regulation here.
• F6.08Derivative time constant DI: Set according to actual demand. No regulation here.
• F6.09Sampling period: No need to alter.

• F6.10Deviation limit: Set according to actual demand. No regulation here.
• F6.11Close-loop preset frequency: Set according to actual demand. No regulation here.
• F6.12Preset frequency holding time : Set according to actual demand. No regulation here.
• F6.13Sleep threshold: Set according to actual demand. No regulation here.
• F6.14Revoke threshold: Set according to actual demand. No regulation here.
Other parameters remain the factory defaults. Corresponding initiate modes and other operations shall be modified in the light of actual conditions and requirements.
The above are parameters modified according to the requirements of examples. When using PID function, one shall modify these parameters in according with his actual requirements to proceed control.

WARNING

• The contactor KM1 and KM2 must be designed in interlocked manner to realize converting between power frequency and variable frequency. It is forbidden to close synchronously. Otherwise, it may lead to permanent damage to the inverter.

Chapter 6 Description of Function Parameters

6.1 Schedule of Function Parameters

Tips

• The mark "√" indicates the setting value of parameter can be modified no matter when the inverter is shutdown or running.
• The mark "×" indicates the setting value of parameter can be modified only when the inverter is shutdown, and can not be modified when the inverter is running.
• The mark "_" indicates the parameter can be displayed only and can not be modified.

6.1.1 Basic Operation Functions

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F0.00	Control Mode Setting	0: Open vector control 1: V/F control		1	1	X
F0.01	Frequency setting mode selection	0: Set by the operator panel potentiometer. 1: Digital setting 1, Operator panel ▲/▼ key or digital encoder setting. 2: Digital setting 2, terminal UP/DOWN setting. 3: Digital setting 3, 485 COM setting. 4: AVI analog setting (0~10mA). 5: ACI analog setting (0~20mA). 6: Terminal impulse putting (0~10KHz) 7: Combined setting 8: External terminal selection		1	1	√
F0.02	Digital frequency control	LED units digit, power off storage 0: Store 1: No store LED tens digit: shutdown remain 0: Remain 1: No remain LED hundreds digit: Remain LED thousands digit: Remain Note: Valid only when F0.01=1, 2, 3		1	00	√
F0.03	Operation frequency setting	0.00Hz ~ Upper limit frequency	Hz	0.01	50.00 Hz	√
F0.04	Operation control mode selection	0: Operator panel RUN/STOP key control 1: External terminal control 2: 485 COM control		1	0	√
F0.05	Motor rotating direction selection	0: Forward 1: Reverse 2: No reverse		1	0	√
F0.06	Upper limit frequency	Lower limit frequency~400.00Hz	Hz	0.01	50.00Hz	X

6.1.1 F0 Series Basic Functions (Continued)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F0.07	Lower limit frequency	0.00Hz~upper limit frequency	Hz	0.01	0.00Hz	X
F0.08	Basic operation frequency	1.00Hz~upper limit frequency	Hz	0.01	50.00Hz	X
F0.09	Max. output voltage	380 series:200~500V 220 Series:100~250V	V	1	380V 220V	X
F0.10	Machine Type selection	0: Type G (Constant torque load) 1: Type P (Fan, pump load		1	0	X
F0.11	Torque lifting selection	0: Hand-operated 1: Auto		1	0	X
F0.12	Torque lifting setting	0.0~30.0% (Valid only when F0.11=0)	%	0.1	According to specification	√
F0.13	Slip frequency compensation	0.0~150.0%	%	0.1	0.0%	√
F0.14	Acceleration time 1	0.1~3600.0s Note: The default unit is "second"; See unit selection F3.09	s	0.1	According to specification	√
F0.15	Deceleration time 1		s	0.1	According to specification	√
F0.16	V/F curve setting	0: constant torque 1: fall torque curve 1 (1.7 power) 2: fall torque curve 1 (2.0 power) 3: User setting V/F curve (F0.17~F0.22)		1	0	X
F0.17	V/F frequency value F1	0.00~frequency value F2	Hz	0.01	12.50Hz	X
F0.18	V/F voltage value V1	0.0~voltage value V2	%	0.1%	25.0%	X
F0.19	V/F frequency value F2	Frequency value F1~frequency value F3	Hz	0.01	25.00Hz	X
F0.20	V/F voltage value V2	Voltage value V1~voltage value V3	%	0.1%	50.0%	X
F0.21	V/F frequency value F3	Frequency value F2 Basic operation frequency	Hz	0.01	37.50Hz	X
F0.22	V/F voltage value V3	Voltage value V2~100.0%	%	0.1%	75.0%	X
F0.23	REV/JOG function selection	0: REV 1: JOG		1	1	√

6.1.2 F1 Series Motor and Vector Control Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F1.00	Motor rated voltage	380:200～500V 220:100～250V	V	1	380V 220V	√
F1.01	Motor rated current	0.1～500.0A	A	0.1	According to specification	√
F1.02	Motor rated rotary speed	300～6000rpm	rpm	1	According to specification	X
F1.03	Motor rated frequency	1.00～400.00Hz	Hz	0.01	50.00Hz	X
F1.04	Motor vacant load current	0.1～500.0A	A	0.1	According to specification	√
F1.05	Motor stator resistance	0.001～10.000Ω	Ω	0.001	According to specification	X
F1.06	Motor rotor resistance	0.001～10.000Ω	Ω	0.001	According to specification	X
F1.07	Motor stator inductance Motor rotor inductance	0.01～600.00mH	mH	0.01	According to specification	X
F1.08	Motor stator mutual inductance Motor rotor mutual inductance	0.01～600.00mH	mH	0.01	According to specification	X
F1.09	Remain				-	-
F1.10	slip compensate coefficient	0.50～2.00		0.01	1.00	√
F1.11	Motor beforehand excitation selection	0: The condition is valid. 1: Always valid.		1	0	X
F1.12	Motor beforehand excitation duration time	0.1～10.0s	s	0.1	0.2s	X
F1.13	Motor parameter self-learning	0: No action. 1: Static self-learning (valid only when F0.00=0).		1	0	X
F1.14	Speed ring (ASR) proportional gain	0.01～5.00		0.01	1.00	√
F1.15	Speed ring (ASR) integral time	0.01～10.00s	s	0.01	2.00s	√

6.1.3 F2 Series Auxiliary Operation Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F2.00	Starting mode selection	0: Start with initial frequency. 1: Start with rotary speed tracing.		1	0	X
F2.01	Starting frequency	0.00～10.00Hz	Hz	0.01	1.00Hz	√
F2.02	Starting frequency sustain time	0.0～10.0s	s	0.1	0.0s	X
F2.03	Starting DC braking current	0.0～100.0%	%	0.1	0.0%	√
F2.04	Starting DC braking time	0.0: Braking inaction 0.1～30.0s	s	0.1	0.0s	X
F2.05	Acceleration/Deceleration mode selection	0: Linear acceleration/deceleration 1: S curve acceleration/deceleration		1	0	√
F2.06	S curve initial section time ratio	10.0～40.0%	%	0.1	20.0%	X
F2.07	S curve rise/fall section time ratio	10.0～80.0%	%	0.1	60.0%	X
F2.08	AVR function selection	0: Disabled 1: Enabled		1	1	X
F2.09	Auto energy saving operation selection	0: Disabled 1: Enabled		1	0	X
F2.10	FWD/REV dead time	0.0～10.0s	s	0.1	2.0s	X
F2.11	Stop mode selection	0: Accelerated stop 1: Free stop		1	0	X
F2.12	Stop DC braking initial frequency	0.00～20.00Hz	Hz	0.01	0.00Hz	√
F2.13	Stop DC braking current	0.0～100.0%	%	0.1	0.0%	√
F2.14	Stop DC braking time	0.0: Braking inaction 0.1~30.0s	s	0.1	0.0s	X
F2.15	Power cut restarting selection	0: Disabled 1: Regular start 2: Start with rotary speed tracing		1	0	X
F2.16	Power cut restarting wait time	0.0～20.0s	s	0.1	0.5s	X
F2.17	Failure auto reset times	0～10		1	0	X

6.1.3 F2 Series Auxiliary Operating Parameters (Continuation…)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F2.18	Failure auto reset interval time	0.5～25.0s	s	0.1	3.0s	X
F2.19	JOG operation frequency setting	0.00～400.00Hz	Hz	0.01	10.00Hz	√
F2.20	JOG acceleration time setting	0.1～3600.0s Note: The default unit is "second". Refer to F3.09 for unit selection.	s	0.1	According to specification	√
F2.21	JOG deceleration time setting		s	0.1	According to specification	√
F2.22	Acceleration time 2	0.1～3600.0s Note: The default unit is "second". Refer to F3.09 for unit selection.	s	0.1	According to specification	√
F2.23	Deceleration time 2		s	0.1	According to specification	√
F2.24	Acceleration time 3	0.1～3600.0s Note: The default unit is "second". Refer to F3.09 for unit selection.	s	0.1	According to specification	√
F2.25	Deceleration time 3		s	0.1	According to specification	√
F2.26	Acceleration time 4	0.1～3600.0s Note: The default unit is "second". Refer to F3.09 for unit selection.	s	0.1	According to specification	√
F2.27	Deceleration time 4		s	0.1	According to specification	√
F2.28	1st stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	5.00Hz	√
F2.29	2nd stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	10.00Hz	√
F2.30	3rd stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	15.00Hz	√
F2.31	4th stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	20.00Hz	√
F2.32	5th stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	25.00Hz	√
F2.33	6th stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	30.00Hz	√
F2.34	7th stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	40.00Hz	√
F2.35	Remain				-	-
F2.36	Leap frequency 1	0.00 ~ upper limit frequency	Hz	0.01	0.00Hz	√
F2.37	Range of leap frequency 1	0.00 ~ 10.00Hz	Hz	0.01	0.00Hz	√
F2.38	Leap frequency 2	0.00 ~ upper limit frequency	Hz	0.01	0.00Hz	√

6.1.3 F2 Series Auxiliary Operating Parameters (Continuation…)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F2.39	Range of leap frequency2	0.00～10.00Hz	Hz	0.01	0.00Hz	√
F2.40	Leap frequency 3	0.00 ~ upper limitfrequency	Hz	0.01	0.00Hz	√
F2.41	Range of leap frequency3	0.00～10.00Hz	Hz	0.01	0.00Hz	√
F2.42	Carrier frequency	1.0～15.0KHz	KHz	0.1	According to specification	√
F2.43	PWM adaptive control	0：Fixed carrier 1:Auto Carrier Line Up		1	1	√

6.1.4 F3 Series User Management Interface Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F3.00	LCD Language Selection	0：Chinese 1： English		1	0	√
F3.01	Parameter Initializing	0： No operation. 1： Restore to the defaultsetting. 2： Clear failure record.		1	0	X
F3.02	Parameter Write Protection	0：All the parameters areallowed to be modified. (Some parameterscan not be modified duringoperation). 1： Only frequency setting isallowed to be modified. 2： All the parametersare prohibited to be modified. Note: The abovelimitations are invalid on this parameter.		1	0	√
F3.03	Remain				–	–
F3.04	Selection of monitoring parameter 1	0～18		1	0	√
F3.05	Selection of monitoring parameter 2	0～18		1	1	√

6.1.4 F3 Series User Management Interface Parameters (Continuation…)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F3.06	Linear velocity coefficient	0.01～100.0		0.01	1.00	√
F3.07	Closed loop display coefficient	0.01～100.0		0.01	1.00	√
F3.08	Software edition	0.00～99.99		0.01	–	–
F3.09	Acceleration/Deceleration time unit	0：Second 1：Minute		1	0	√

6.1.5 F4 Series On-off Input/Input Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F4.00	Function of input terminal X1	0： No function 1： Multi-stage speed selection 1 2： Multi-stage speed selection 2 3： Multi-stage speed selection 3 4： Acceleration time selection1 5： Acceleration time selection2 6： Channel frequency class selection 1 7： Channel frequency class selection 2 8： Channel frequency class selection 3 9： FWD jog control 10： REV jog control 11： Free stop control 12： Frequency increasing/UP command 13： Frequency decreasing/DOWN command		1	0	X
F4.01	Function of input terminal X2			1	0	X
F4.02	Function of input terminal X3			1	0	X

6.1.5 F4 Series Switch Quantity Input/Output Parameters (Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F4.03	Function of input terminal X4	14: External equipment failure input 15: Three-wire operation control 16: DC braking command 17: Counter clear input 18: Counter impulse input (Valid for X6 only) 19: External impulse input (Valid for X6 only) 20: External reset signal input 21: UP/DOWN terminal frequency clear 22: PID operation input 23: Programmable multi-stage speed operation input 24: Wobble operation input 25: Wobble State Reset 26: External stop command 27: Operation inhibit command 28: Acceleration/Deceleration inhibit command (remain) 29: Command switches to terminal 30: Frequency switches to VCI 31: Timing starts 32: Timing clear		1	0	X
F4.04	Function of input terminal X5			1	0	X
F4.05	Function of input terminal X6			1	0	X
F4.06	FWD/REV Terminal Control Mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2 (Remain)		1	0	X

6.1.5 F4 Series Switch Quantity Input/Output Parameters (Continuation....)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F4.07	Open-circuit Collector Output terminal Y1 setting	0: Inverter in operation instruction 1: Frequency/Speed arrival signal (FAR) 2: Frequency/Speed level detecting signal (FDT) 3: Inverter zero rotary speed in operation instruction 4: External equipment failure shutdown 5: Output frequency arrival upper limit 6: Output frequency arrival lower limit 7: Programmable multi-stage speed operation one cycle finished 8: Inverter overload alarm signal 9: Inverter operation is ready 10: Counter detection signal output 11: Counter reset signal output 12: Inverter failure 13: Under-voltage locking shutdown 14: Wobble upper/lower limit 15: Programmable multi-stage speed operation is finished. 16: Remain 17: Timing impulse output		1	0	√
F4.08	Open-circuit Collector Output terminal Y1 setting			1	1	√
F4.09	Programmable relay output setting			1	12	√
F4.10	FDT level setting	0.00Hz～Upper limit of frequency	Hz	0.01	10.00Hz	√
F4.11	FDT lagged value	0.00～30.00Hz	Hz	0.01	1.00Hz	√
F4.12	Frequency arrival (FAR) checkout range	0.00～15.00Hz	Hz	0.01	5.00Hz	√
F4.13	Overload pre-alarm level	20～120%	%	1	100%	√
F4.14	Overload pre-alarm action time	0.0～15.0s	s	0.1	1.0s	X
F4.15	Counter reset value setting	Counter detection value setting~60000		1	1	X
F4.16	Counter detection value setting	0~counter reset value setting		1	1	X

6.1.6 F5 Series Analog Input/Output Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F5.00	AVI input lower limit voltage	0.0V~AVI input upper limit voltage	V	0.1	0.0V	√
F5.01	AVI input upper limit voltage	AVI input lower limit voltage~ 10.0V	V	0.1	10.0V	√
F5.02	ACI input lower limit current	0.0mA~ACI input upper limit current	mA	0.1	0.0mA	√
F5.03	ACI input upper limit current	ACI input lower limit current ~ 20.0mA	mA	0.1	20.0mA	√
F5.04	Impulse input lower limit frequency	0.0 ~ impulse input upper limit frequency	KHz	0.1	0.0KHz	√
F5.05	Impulse input upper limit frequency	Impulse input lower limit frequency ~10.0KHz	KHz	0.1	10.0KHz	√
F5.06	Min. analog input corresponding setting frequency	0.00Hz~upper limit frequency	Hz	0.01	0.00Hz	√
F5.07	Max. analog input corresponding setting frequency	0.00Hz~upper limit frequency	Hz	0.01	50.00Hz	√
F5.08	analog input signal delay time	0.1～5.0s	s	0.1	0.5s	√
F5.09	Multi-function analog output AFM	0: Operation frequency 1: Setting frequency 2: Output current 3: Motor rotating speed 4: Output voltage 5: Bus bar voltage 6: PID feed quantity 7: PID feedback quantity		1	0	√
F5.10	Multi-function digital output DFM			1	2	√
F5.11	AFM gain setting	20～200%	%	1	100%	√
F5.12	Remain				-	-
F5.13	DFM gain setting	20～200%	%	1	100%	√
F5.14	Remain				-	-

6.1.6 F5 Series Analog Input/Output Parameters (Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F5.15	Combined feeding path setting	LED units digit: Operation figure 1 0: Keyboard potentiometer 1: Digital setting 1 2: Remain 3: COM setting 4: AVI 5: ACI 6: Terminal impulse LED tens digit: Operation figure: 2 0: Keyboard potentiometer 1: Digital setting 1 2: Remain 3: COM setting 4: AVI 5: ACI 6: Terminal impulse LED hundreds digit: Operation figure: 3 0: Keyboard potentiometer 1: Digital setting 1 2: Remain 3: COM setting 4: AVI 5: ACI 6: Terminal impulse LED thousands digit: Remain		1	000	X

6.1.6 F5 Series Analog Input/Output Parameters (Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F5.16	Combined feeding algorithm setting	LED units digit: algorithm 1 0: Addition 1: Subtraction 2: Absolute value (subtraction) 3: Take the maximal value 4: Take the minimum value LED tens digit: Algorithm 2 0: Addition 1: Subtraction 2: Absolute value (subtraction) 3: Take the maximal value 4: Take the minimum value 5: Operating figure 3 does not participate in algorithm. LED thousands digit: Remain LED thousands digit: Remain Note: The above two parameters are valid only when F0.01=7.		1	00	X

6.1.7 F6 Series PID Function Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F6.00	PID action setting	LED units digit: Function setting 0: Close 1: Open LED tens digit: PID input selection 0: Auto input 1: Input through defined multi-function terminals LED hundreds digit: Remain LED thousands digit: Remain		1	00	X
F6.01	PID given path setting	0: Keyboard potentiometer 1: Digital setting 2: Remain 3: Remain 4: AVI 5: ACI 6: Terminal impulse 7: AVI + ACI 8: ACI ACI 9: MIN (AVI, ACI) 10: MAX (AVI, ACI)		1	1	X
F6.02	PID feedback path setting			1	4	X
F6.03	Given digital quantity setting	0.00 ~ 10.00V	V	0.01	0.0V	√
F6.04	Feedback path gain	0.01 ~ 10.00		0.01	1.00	√
F6.05	Feedback path polarity	0: Positive polarity 1: Negative polarity		1	0	X
F6.06	Proportional gain P	0.01 ~ 10.00		0.01	1.00	√
F6.07	Integral time Ti	0.1 ~ 200.0s	s	0.1	1.0s	√
F6.08	Differential time Td	0.0: No differential 0.1~10.0s	s	0.1	0.0s	√

6.1.7 F6 Series PID Function Parameters (Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F6.09	Sampling cycle T	0.00: Self-motion 0.01～10.00s	s	0.01	0.00s	√
F6.10	Deviation limit	0.0～20.0%	%	0.1	0.0%	√
F6.11	Closed loop preset frequency	0.00～Upper limit frequency	Hz	0.01	0.00Hz	√
F6.12	Preset frequency keep time	0.0～6000.0s	s	0.1	0.0s	X
F6.13	Sleep threshold value	0.00～10.00V	V	0.01	10.00V	√
F6.14	Awake thresholdvalue	0.00～10.00V	V	0.01	0.00V	√
F6.15	Sleep/awake threshold value detection value	0.0～600.0s	s	0.1	300.0s	√

6.1.8 F7 Series ProgrammableOperation Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F7.00	Programmable operation control	LED units digit: PLC operation mode selection 0: No action 1: Single cycle 2: Continuous cycle 3: Remaining the ultimatevalue after single cycle 4: Wobbleoperation LED tens digit: PLC input mode selection 0: Auto input 1: Input through definedmulti-function terminals LED hundreds digit: Remain 0: Auto input 1: Input through definedmulti-function terminals LED thousands digit: Remain		1	000	X

6.1.8 F7 Series Programmable Operation Parameters (Continuation....)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F7.01	1st stage operation time	0.0～6000.0s	s	0.1	10.0s	√
F7.02	2nd stage operation time	0.0～6000.0s	s	0.1	10.0s	√
F7.03	3rd stage operation time	0.0～6000.0s	s	0.1	10.0s	√
F7.04	4th stage operation time	0.0～6000.0s	s	0.1	10.0s	√
F7.05	5th stage operation time	0.0～6000.0s	s	0.1	10.0s	√
F7.06	6th stage operation time	0.0～6000.0s	s	0.1	10.0s	√
F7.07	7th stage operation time	0.0～6000.0s	s	0.1	10.0s	√
F7.08	Remain				-	-
F7.09	Multi-stage speed operating direction 1	LED units digit: Stage1 direction 0: Forward 1: Reverse LED tens digit: Stage 2 direction 0: Forward 1: Reverse LED hundreds digit: Stage 3 direction 0: Forward 1: Reverse LED thousands digit: Stage 4 direction 0: Forward 1: Reverse		1	0000	√
F7.10	Multi-stage speed operating direction 2	LED units digit: Stage5 direction 0: Forward 1: Reverse LED tens digit: Stage 6 direction 0: Forward 1: Reverse LED hundreds digit: Stage 7 direction 0: Forward 1: Reverse LED thousands digit: Remain		1	000	√

6.1.8 F7 Series Programmable Operation Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F7.11	Wobble operation parameters	LED units digit: Remain LED tens digit: wobble control 0: Fixed wobble 1: Variablewobble LED hundreds digit: Wobble shutdown start selection 0: Start according tothe state memorized before shutdown 1: Restart LED thousands digit: Wobble status: Memory store ornot after power failure 0: Store the wobblestatus after power failure. 1: Do not storethe wobble status after power failure.		1	000	X
F7.12	Wobble presetfrequency	0.00~upper limit frequency	Hz	0.01	10.00Hz	√
F7.13	Wobble presetfrequency waiting time	0.0～3600.0s	s	0.1	0.0s	X
F7.14	Wobble range	0.0～50.0%	%	0.1	10.0%	√
F7.15	Trip frequency	0.0～50.0%	%	0.1	10.0%	√
F7.16	Wobble cycle:	0.1～3600.0s	s	0.1	10.0s	√
F7.17	Triangle rising time	0.0～100.0%	%	0.1	50.0%	√
F7.18	Wobble centerfrequency standard	0.00~upper limit frequency	Hz	0.01	10.00Hz	√

6.1.9 F8 Series Communication Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F8.00	Host address	0: Host 1～31: Modbus		1	1	X
F8.01	Communication configure	LED units digit: Baud rate selection 0:1200BPS 1:2400BPS 2:4800BPS 3:9600BPS 4:19200BPS 5:38400BPS **LED tens digit: data format** **0: No parity** **1: Even parity** **2: Odd parity** **LED hundreds digit:** **Communication failure action selection** **0: Stop** **1: Remain the presentstate** **LED thousands digit:** **Remain**		1	013	X
F8.02	Communication time-out checkout time	0.0～100.0s	s	0.1	10.0s	X
F8.03	Host response delay	0～1000ms	ms	1	5ms	X
F8.04	gearing rate setting	0.01～10.00		0.01	1.00	√

6.1.0F9 Series Protection Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F9.00	Motor overload protection coefficient	30%～110%	%	1	105%	√
F9.01	Under-voltage protection level	380V：360～480V 220V：180～240V	V	1	400V 200V	√
F9.02	Over-voltage protection level	380V：660～760V 220V：330～380V	V	1	700V 350V	√
F9.03	Current amplitude limiting level	120%～220%	%	1	180%	√

6.1.1FA Series High-level Function Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
FA.00	Zero frequency operation threshold	0.00～50.00Hz	Hz	0.01	0.00Hz	√
FA.01	Zero frequency return difference	0.00～50.00Hz	Hz	0.01	0.00Hz	√
FA.02	Energy consumption braking initial voltage	380V:600～750V 220V:300～375V	V	1	740V 370V	√
FA.03	Energy consumption braking action proportion	10～100%	%	1	50%	√
FA.04	Cooling fan control	0: Auto operation 1: Operating since energized.		1	0	√
FA.05	UP/DOWN terminal modification speed ratio	0.01～100.00Hz/s	Hz/s	0.01	1.00Hz/s	√
FA.06	Over modulation enabled	0: Disabled 1: Enabled		1	0	X
FA.07	Timing	0～65535s	s	1	0s	√
FA.08 ～ FA.12	Remain				-	-

6.2 Detailed Description on Function Parameters

F0 Series Basic Operation Parameters

F0.00 Control Mode Setting Setting Range: 0~1 Factory Default Setting: 1

This function is used to select the inverter's control mode.
0: Open-ring Vector Control
This is also called "SVC", indicating no speed sensor vector control, which is applicable to high performance speed regulation without installing an encoder.
1: V/F Control
This is applicable to the speed regulation where there are no high requirements for the speed control precision, low frequency torque and other performances, and can be used when several motors are driven by an inverter.

Tips

- If vector control mode is selected, it is necessary to learn the motor parameters before the first operation to get the exact motor parameters. Be sure the nameplate data of the motor conforms to the motor parameters of the inverter before self-study. Otherwise, self-study can not be accomplished or error results will be turned out. If the nameplate data of the motor can not be received, then V/F control mode is suggested.
- If vector control mode is selected, be sure to set proper parameters (F1.14, F1.15) for speed regulator to ensure a good stability and dynamic performance.
- If vector control mode is selected, one inverter can drive only one motor and there is not too much gap between the inverter capacity and the motor capacity. Otherwise, the control performance may fall or the machine can not run normally.

F0.01 Frequency setting mode selection Setting range: 0~8 Factory default setting: 1

This function is used to select the operation frequency setting mode of the inverter.
0: Operator panel potentiometer setting:
To regulate the operation frequency by operating the potentiometer on the keyboard.
1: Digital setting,1, operator panel ▲/▼ key or digital encoder setting:
To set the operation frequency by F0.03. The operation frequency can be altered by pressing the keyboard button or by digital encoder. The modified frequency value will be stored into F0.03 after power down. If the frequency is not expected to be saved, just set the parameter F0.02 directly.
2: Digital setting 2, external terminal UP/DOWN setting:
To alter the operation frequency through ON/OFF of external control terminal defined with UP/DOWN frequency function. When UP-COM closes, frequency rises; when DOWN-COM opens, frequency falls; when UP/DOWN closes or opens with COM simultaneously, frequency remains and will not be changed. The modified frequency value will be stored into F0.03 after power down.
The velocity ratio of operation frequency to be modified by UP/DOWN terminal can be set by parameter FA.05.
3: Digital setting 3, 485 COM setting:
To set the operation frequency by frequency command of RS485 communication interface received from the upper (host) machine.
4: External analog voltage signal AVI (0~10V) or external potentiometer setting:
To set the operation frequency by external voltage input terminal AVI. Refer to F5.00~F5.01 for relevant settings.
5: External analog current signal ACI (0~20mA) setting:
To set the operation frequency by external voltage input terminal AVI. Refer to F5.02~F5.03 for relevant settings.
6: External terminal impulse (0~10KHz) setting:
To set the operation frequency by X6 terminal input impulse signal. Refer to F5.04~F5.05 for relevant settings.
7: Combined setting:
The operation frequency is set by linear combination of each setting path. The combination mode is decided by F5.15~F5.16.
8: External terminal selection
To confirm the frequency input path by 8 kinds switching assemblies of external multi-function terminals. The function terminal is defined by F4.00~F4.05. The path corresponding to the combination is shown in the table below.

Frequency path selection terminal 3	Frequency path selection terminal 2	Frequency path selection terminal 1	Frequency setting path
0	0	0	Keyboard potentiometer
0	0	1	Digital setting 1
0	1	0	Digital setting 2
0	1	1	Digital setting 3
1	0	0	AVI analog setting
1	0	1	AVI analog setting
1	1	0	Terminal impulse setting
1	1	1	Combine setting

Table 6-1

Tips

• If the operating keyboard provides a digital encoder, it can substitute the function of ▲/▼ and ENTER keys to realize regulation of digital frequency, modification of parameters and store of data. Therefore, when using the function of this digital encoder, F0.01 shall be set to 1 instead of 0. Otherwise, the frequency setting by digital encoder will be invalid. If the user needs an analog potentiometer to realize frequency setting, do use an analog potentiometer keyboard or an external potentiometer.
• If the frequency setting mode is selected to 6, be sure to select port X6. Others ports are invalid.
• If the frequency setting mode is selected to 8, it is applicable to the occasion of frequency path real-time shifting. E.g., if there is a need to realize shifting of voltage setting to current setting, it can be realized by shifting two combinations: the multi-function terminal "100" and "101". Also, this can be realized by the multi-function terminal defined with "frequency shifting to ACI" directly.

F0.02 Digital frequency control Setting range: 00~11 Factory default setting: 00

LED unit digit
0: The setting frequency value is stored in F0.03 after power switches off and restored to this value after power switches on again.
1: The setting frequency will lose automatically after the inverter switches off. The inverter will start rotating at the frequency of 0.0Hz when re-energized.

LED tens digit
0: The setting frequency remains the same after shutdown.
1: The setting frequency will restore to F0.03 if de-energized.

TIPS

• LED units digit setting is valid only when F0.01=1, 2, 3.
• LED tens digit setting is valid only when F0.01=1, 2, 3. If F0.01=1, it is regarded as a default of shutdown setting frequency remaining.

F0.03 Operation frequency setting Setting range: 0.00Hz~upper limit frequency
Factory default setting: 50.00Hz

If the frequency setting mode is selected as F0.01=1,2,3, then this parameter will be the initial setting frequency of the inverter. If F0.01=1, the frequency can be modified directly by ▲/▼ key on the operator panel. If F0.01=2, the frequency shall be operated to the initial frequency and decide UP or DOWN according to the open or close of UP/DOWN.

TIPS

• The upper limiting operation frequency is limited by the upper limiting frequency F0.06, and the lower limiting value is limited by the lower limiting frequency F0.07.
• F0.03 is the setting frequency for first stage speed when there is a programmable multi-stage speed running .

F0.04 Operation control mode selection Setting range: 0~2 Factory default setting: 0

This function is used to set the control mode for inverter's operation commands such as forwarding, reversing, jogging and stop.
0: Controlled by the operator panel
To control motor's start or stop by the press button RUN, STOP, REV/JOG on the operator panel.
1: Controlled by external terminal
To control motor's start or stop through ON/OFF of external terminal FWD/REV-COM.
2: Controlled by 480 COM
To control motor's start or stop by 485 COM.

F0.05 Motor rotating direction selection Setting range: 0~2 Factory default setting: 0

This function is used to change motor's rotating direction.
0: Forward
1: Reverse
2: Reverse disabled

F0.06 Upper limiting frequency Setting range: lower limiting frequency~400.00Hz
Factory default setting: 50.00Hz

F0.07 Lower limiting frequency Setting range: 0.00Hz~upper limiting frequency
Factory default setting: 0.00Hz

The upper limit of frequency refers to the allowable maximum output frequency of the inverter, as shown in f_3 of Fig. 6-1.
The lower limit of frequency refers to the allowable minimum output frequency of the inverter, as shown in f_1 of Fig. 6-1.
During actual running, if the set frequency is smaller than the lower limit of frequency, the inverter will reduce the value of output frequency relevantly. When it reaches the lower limit of frequency, the inverter will decide its steady state output according to the running frequency set by the lower limit of frequency.

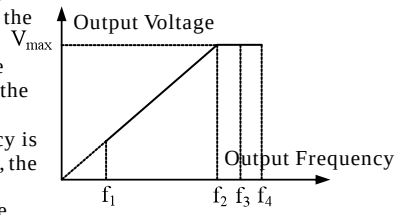


Fig.6-1 Diagram of Upper/Lower Limit of Frequency

F0.08 Basic operation frequency Setting range: 1.00~uppper limiting frequency
Factory default setting: 50.00Hz

Basic operation frequency is the minimal frequency corresponding to the maximum voltage output by the inverter. Generally, it is motor's rated frequency, which is the basis for frequency setting and acceleration/deceleration time. Note: This can not be regulated at will, as shown in f_2 of Fig.6-1.

F0.09 Maximum output voltage Setting range: 100~500V
Factory default setting: Determined as per specification

This is the maximum output voltage corresponding to the basic frequency output by the inverter. Generally, it is motor's rated voltage. Under the mode of V/F control, output voltage value can be changed by regulating this parameter, while under the mode of vector control, this parameter will be invalid, as shown in V_{max} of Fig.6-1.

F0.10 Model selection Setting range: 0~1 Factory default setting: 0

0: Model G
Applicable to constant torque constant torque loads.
1: Model P
Applicable to loads of fan, pump series that the torque and the rotating speed is parabolic.

Caution

• This parameter can not be changed at will. Otherwise, there will be error display of the inverter's current, causing abnormal operation.

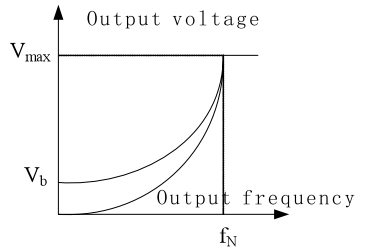
F0.11 Torque lifting selection Setting range: 0~1 Factory default setting: 0

This parameter is used to lift motor's low frequency torque characteristic under V/F mode. It will be invalid under vector control.
0: Hand-operated
Torque lifting voltage is set by parameter F0.12, and the voltage will rise according to the value set by F0.12.
1: Auto

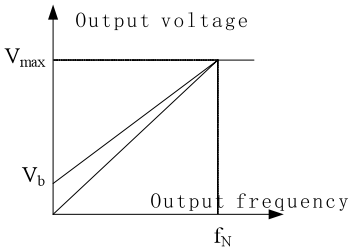
Torque lifting voltage changes as the rotator current changes. The larger the rotator current is, the larger voltage is lifted. If auto torque lifting is set, magnetic circuit saturation caused by overlarge lifting voltage when the motor has a light load can be prevented and overheat can e avoided when the motor is in low frequency operation.
The formula for auto torque lifting voltage is shown below:
Lifting voltage= (F0.12÷200)× F0.09×(Inverter output current÷ inverter rated current)
The calculation method for hand-operated torque lifting voltage is similar to auto torque lifting. The difference lies in that hand-operated torque lifting voltage should remove the ratio of output current to rated current. The torque value shall be moderate in accordance with loads.

F0.12 Torque lifting selection Setting range: 0.0~30.0% Factory default setting: as per spec.

Excitation voltage falls in the zone of low frequency rotation. So, it is necessary to compensate excitation current of the motor and enhance the torque in the state of low frequency rotation (improve V/F characteristic), as shown in Fig.6-2.



1 Square descending torque characteristic



2 Constant torque characteristic

Fig.6-2 Torque Lifting Diagram

The "Vb" in the figure refers to manual torque lifting voltage; "Fn" refers to rated frequency of the inverter.

CAUTION

Too high torque lifting may result in over-current protection of the inverter which may lead to failure starting of the motor. When this occurs, the setting value shall be decreased properly.

WARNING

• Heat dissipation will be less effective when a motor runs at a low frequency for a long period. Oversetting of torque lifting value in this case may speedup this phenomena and lead to burnout of the motor. DO keep in mind to take a forced method to release heat from the exterior of motor or perform derating before use.

F0.13 Slip frequency compensation Setting range: 0.0~150.0% Factory default setting: 0.0%

During actual rotation, a motor's slip is influenced by variation in load torque, which causes deviation of actual speed from the expected value. With slip compensation function, the inverter's output power can be adjusted automatically with load torque fluctuation of the motor, which can compensate off-speed arising from load fluctuation of the motor and thus improve accuracy of speed.
This parameter is valid if F0.01=1, as shown in Fig.6-3.

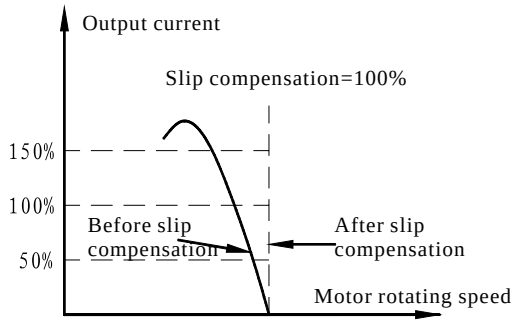


Fig.6-3 Slip Frequency Compensation Description

F0.14 Acceleration time 1 Setting range: 0.1~3600.0s Factory default setting: as per spec.
F0.15 Deceleration time 1 Setting range: 0.1~3600.0s Factory default setting: as per spec.

Acceleration time refers to the period during which the output frequency of the inverter is accelerated from 0.00Hz to basic frequency, as shown in t_1 of Fig.6-4.
Deceleration time refers to the period during which the output frequency of the inverter is decelerated from basic frequency to 0.00Hz, as shown in t_2 of Fig. 6-4.

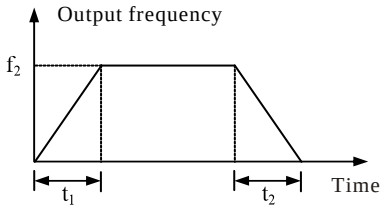


Fig.6-4 Diagram of Acceleration/Deceleration Time

Tips

• This inverter series provide 4 groups of acceleration/deceleration time parameters. Others are defined in the parameter F2.22~F2.27 with default value of "1". Please select other groups of acceleration/deceleration time parameters through control terminal if other groups are preferred.

F0.16 V/F curve setting Setting range: 0~3 Default setting: 0

0: Constant torque
This indicates the inverter's output voltage is of positive ratio to frequency, applicable to most loads, as shown in 1 of Fig.6-5.
1: Decreased torque curve 1
This indicates the output is a 1.7 power decreased torque curve, as shown in 2 of Fig.6-5.
2: Decreased torque curve 2
The output is the second power decreased torque curve, as shown in 3 of Fig.6-5.

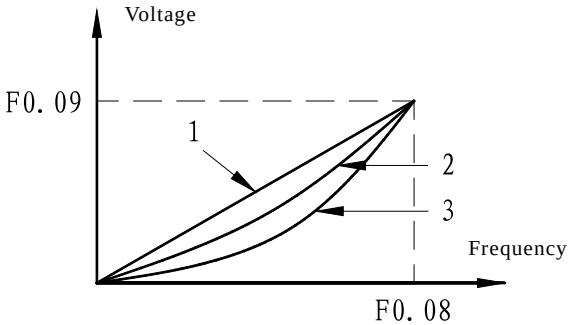


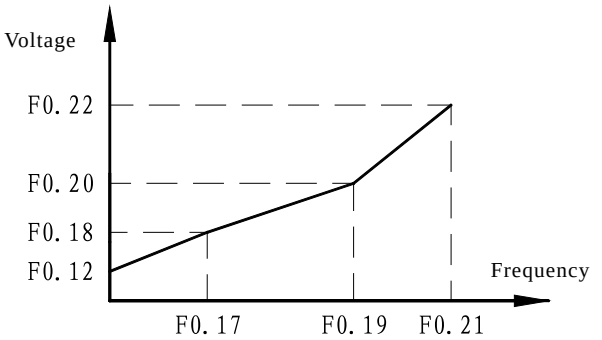
Fig.6-5 V/F Curve

Curve 2 and 3 are applicable to fans, pumps and other variable torque loads. Curve 3 has better effect on energy saving comparing with Curve 2. Noteworthy, when the motor runs according to curve 2 and curve 3, unsteady operation may occur because the motor is in a state of under excitation. Hence it is necessary to set the curve as per detailed conditions. Or adopt a self-defined V/F curve.

3: Self-defined V/F curve
When selecting this mode, just set the expected V/F curve through F0.17~F0.22, As shown in Fig.6-6.

F0.17 V/F frequency value F1 Setting range: 0.00~frequency value F2 Default setting: 12.50Hz
F0.18 V/F voltage value V1 Setting range: 0.0~voltage value V2 Default setting: 25.0%
F0.19 V/F frequency value F2 Setting range: frequency value F1~F3 Default setting: 12.50Hz
F0.20 V/F voltage value V2 Setting range: voltage value V1~V2 Default setting: 25.0%
F0.21 V/F frequency value F3 Setting range: F2~basic frequency Default setting: 12.50Hz
F0.22 V/F voltage value V3 Setting range: voltage value V2~100% Default setting: 25.0%

This function parameter groups are used to set expected V/F curve flexibly, as shown in Fig.6-6.



.6-6 V/F Curve

F0.23 REV/JOG function selection Setting range: 0~1 Default setting: 1

This function is used to set the REV/JOG function on the operator panel.
0: REV function
1: JOG function

Group F1 Motor and Vector Control Parameters

F1.00 Motor rated voltage Setting range: 100~500V Default setting: as per spec.
F1.01 Motor rated current Setting range: 0.1~500.0A Default setting: as per spec.
F1.02 Motor rated rotating speed Setting range: 300~6000rpm Default setting: as per spec.
F1.03 Motor rated frequency Setting range: 1.00~400.00Hz Default setting: 50.00Hz
F1.04 Motor vacant load current Setting range: 0.1~500.0A Default setting: as per spec.

The above parameter groups are electrical parameters for the motor being controlled. If the inverter is not matched with the motor power rate (the gap shall not exceed two specification grades), it is still necessary to ensure the motor's rated current input be set to F1.01, so as to guarantee the accuracy of parameter detection of the controlled motor and get a better control effect.

F1.05 Stator resistance Setting range: 0.001~10.000Ω Default setting: as per spec.
F1.06 Rotator resistance Setting range: 0.001~10.000Ω Default setting: as per spec
F1.07 Stator & rotator inductance Setting range: 0.01~600.00mH Default setting: as per spec.
F1.07 Stator & rotator mutual inductance Setting range: 0.01~600.00mH Default setting: as per spec.
F1.09 Remain

The above parameters are used to set basic frequency of the motor. The followings are necessary parameters for vector control.
This software contains a parameter group for a standard four-pole motor and this parameter is already the default one. But this parameter is not always in full accord with actual electrical parameter for the controlled motor. To get a good control effect and exact motor parameter, it is suggested to adopt the motor parameter self-learning function.
Once the motor's self-learning is completed, parameter F1.05~F1.08 will be renewed conditionally.

Caution

• Before preceding the function of self-learning, DO confirm parameters on the motor's nameplate are correctly entered. If the motor capacity does not match the inverter, yet perform operation in vector mode without having motor's self-learning, it may lead to the inverter's out of control.

F1.10 Slip compensation coefficient	Setting range: 0.50~2.00	Default setting: 1.00

Proceeding vector control over no speed sensor, this parameter is used to adjust motor's stability precision. Increase this parameter when the motor has heavy loads with lower speed and decrease this parameter vise versa.

F1.11 Motor pre-excitation selection	Setting range: 0~1	Default setting: 0

If the motor is in the state of halting before it is started, it is supposed to build air-gap flux to get enough starting torque.
0: Conditionally valid
If this choice is selected, the motor will perform pre-excitation when the motor is started, sustain for a period of time set by parameter F1.12 and then proceed acceleration; or it will proceed control through multi-function terminals defined with starting pre-excitation command (remained temporarily).
1: Always valid
When the inverter is started, it performs pre-excitation function over the motor (always sustain 0.00Hz).

F1.12 Motor pre-excitation sustaining time	Setting range: 0.1~1.0s	Default setting: 0.2s

This parameter defines pre-excitation sustaining time of the motor in the mode of vector control. In this state, rated pre-excitation current passes through the motor, as if the motor is in the state of DC braking. Therefore in the mode of vector control, DC braking is invalid. To realize the effect of DC braking, user may regulate the function of pre-excitation and its sustaining time.

F1.13 Motor parameter self-learning	Setting range: 0~1	Default setting: 0

0: No action
This indicates there is no action of static self-learning.
1: Static self-learning
If motor parameter self-learning is selected, press the RUN key, self-learning of the motor will be started. This course can be finished automatically without any manual intervention. During self-learning, the inverter does not respond to other operation commands. After parameter self-learning is completed, this parameter will be cleared automatically and the motor parameter received from self-learning will be saved in the inverter's control panel. In other words, parameter F1.05~F1.08 will be updated conditionally.

CAUTION

• This parameter is valid only when vector control is validated (F0.00=0) and the operation mode is controlled by operator panel (F0.04=0)

Tips

• If over current occurs during parameter self-learning, please check if the motor's current matches with the inverter's rated current. Before parameter self-learning, DO make sure the motor is in the state of stop, otherwise self-learning cannot perform normally. The advantage of static self-learning is that motor parameter testing can be carried out even though there is load on the motor's shaft.

F1.14 Velocity loop (ASR) proportional gain	Setting range: 0.0~5.00	Default setting: 1.00
F1.15 Velocity loop (ASR) integral time	Setting range: 0.01~10.00s	Default setting: 2.00s

Parameter F1.14 and F1.15 are valid only for vector control and invalid for V/F control. Increasing proportional gain may quicken dynamic response of the system, but over-large may cause oscillation; Decreasing integral time may quicken dynamic response of the system, but over-small may cause system's severe over-control and oscillation. Generally, it is suggested to increase proportional gain as much as possible on the premise that there is no oscillation of the system, and then adjust the integral time to enable a faster dynamic response and a moderate over-control of the system.

Group F2 Auxiliary Operation Parameters

F2.00 Starting mode selection	Setting range: 0~1	Default setting: 0

0：Start at the starting frequency
The inverter starts at a certain initial frequency, which is the starting frequency (F2.01).
1：Start in the mode of rotation speed tracking
Track motor's rotation speed and direction automatically. Then take the tracked speed as its starting speed and run to the set frequency according to the acceleration and deceleration time.

F2.01 Starting frequency	Setting range: 0.00~20.00Hz	Default setting: 0.00Hz
F2.02 Starting frequency holding time	Setting range: 0.0~30.0S	Default setting: 0.0S

Starting frequency is the initial frequency when the inverter starts, as shown in Fig.6-7. To ensure enough starting torque, the starting frequency should be set properly.

Starting frequency maintaining time refers to the time kept by starting frequency when the inverter starts running, as shown in Fig.6-7.

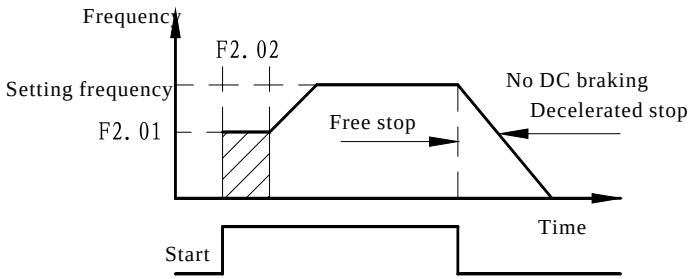


Fig.6-7 Start and Stop Frequency Output Curve

F2.03 Starting DC braking current	Setting range: 0.0~100.0%	Default setting: 0.0%
F2.04 Starting DC braking time	Setting range: 0.0~20.0S	Default setting: 0.0S

Starting DC braking current: This indicates the percentage of braking current during the inverter is started in the mode of DC starting.
Starting DC braking time: This indicates a specified period of time used to start the motor by DC braking which will be invalid if it is 0.0s.

TIPS

• DO take into the consideration of loads before generating DC braking current and deciding the braking time. DO NOT overset the current, for over-current may result in current trip. As for high-speed inertia load, it is not advisable to start the machine in the mode of DC braking, which is valid only when F0.00=1.

F2.05 Acceleration/Deceleration mode selection	Setting range: 0~1	Default setting: 0

0：Linear acceleration/deceleration
This indicates the output frequency increases or decreases in accordance with constant slope.
1：S curve acceleration/deceleration
To reduce noise and vibration of the mechanical system, DO change the output frequency slowly and gradually when the acceleration/deceleration begins or ends, as shown in Fig.6-8.

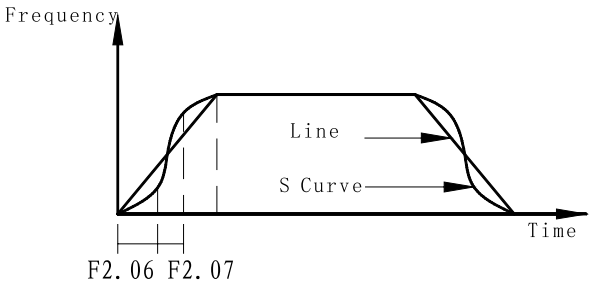


Fig.6-8 Acceleration/Deceleration Curve

F2.06 S curve initial stage time percentage Setting range: 10.0~40.0% Default value: 20.0%
2.07 S curve rise/fall stage time percentage Setting range: 10.0~80.0% Default value: 60.0%

S curve initial stage, as shown in Fig.6-8, is the course during which the slope of output frequency gradually increases from 0.
S curve rise stage, as shown in Fig.6-8, is the stage that the slop of output frequency remains constant.
Combined using of the above parameters, is particularly applied to start or stop of loads during delivery or move.

F2.08 AVR function selection Setting range: 0 ~ 1 Default value: 1

0：Disabled
1：Enabled
AVR means automatic voltage regulation. When deviation occurs between input voltage and rated input voltage of the inverter, this function is applied to stabilize the output voltage of the inverter through auto regulation of duty factor of PWM.

This function is invalid if the output command voltage is higher than the input power supply voltage. During deceleration, if AVR function is disabled, the deceleration time will be short but the operation current will be bigger; if AVR is enabled, the motor will decelerate steadily but the operation current will be smaller.

F2.09 Selection of automatic energy-saving operation Setting range: 0~1 Default value: 0

When selecting automatic energy-saving operation, the inverter will automatically regulate the motor's output voltage by detecting the load current, so as to get minimum product (electric power) of voltage and current and realize energy saving.

0：Disabled 1：Enabled

CAUTION

- This function is applicable to loads like fans, water pumps and etc.
- Automatic energy-saving operation is invalid during acceleration and deceleration.

F2.10 FRD/REV Dead Time Setting range: 0.0~10.0s Default value: 0.0s

This indicates the interval between FRD and REV when the inverter transfers from forward running to 0.00Hz then to reverse running; or from reverse running to 0.00Hz then to forward running, as shown in Fig.6-9.

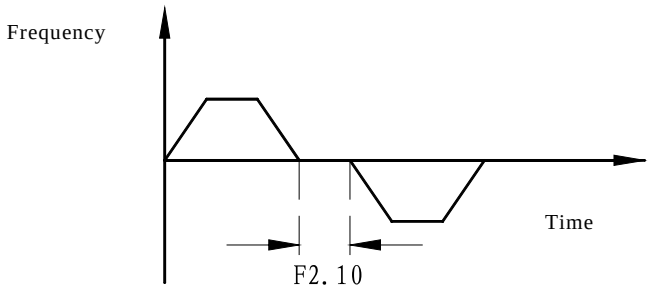


Fig.6-9 FRD/REV Dead Time

F2.11 Stop mode selection Setting range: 0~1 Default value: 0

0：Decelerating stop
When stop command is received, the inverter will drop off output frequency in accordance with the set decelerating mode and decelerating time till the frequency falls to zero and stop. If DC braking function is selected, then the inverter will begin braking when the frequency reaches the braking initial frequency and shut down after DC braking is accomplished.
1：Free stop
Once stop command is received, the inverter will discard output immediately and the load will stop freely in accordance with the rule of mechanical inertia.

TIP

- If decelerating stop (F2.11=0) is selected, the inverter will discard output upon receiving of stop command. When the motor decelerates to the **shutdown DC braking starting frequency** (F2.12) (which indicates the inverter's starting frequency when the motor is shutdown by DC braking), the inverter will stop by braking according to **shutdown DC braking voltage** (which indicates the inverter's voltage when the motor is shutdown by DC braking) set by F2.13 and **shutdown DC braking time** (which indicates a specified period of time used to stop the motor by DC braking) set by F2.14.

F2.12 Shutdown DC braking initial frequency Setting range: 0.00~20.00 Hz Default value: 0.00Hz
F2.13 Shutdown DC braking current Setting range: 0.0~100.0% Default value: 0.0%
F2.14 Shutdown DC braking time Setting range: 0.0~30.0s Default value: 0.0s

F2.12 indicates the frequency when DC braking begins to perform action during the inverter's decelerating stop.
F2.13 indicates the percentage of output current of shutdown DC braking to the inverter's rated output current.
F2.14 indicates a duration time for shutdown DC braking.

Tips

• Oversetting of shutdown DC braking current may easily lead to inverter tripping. DO increase the value bit by bit.
• If shutdown DC braking time is set to 0.0s, there will be no DC braking process.

F2.15 Power off restart mode selection Setting range: 0~2 Default value: 0
F2.16 Power off restart wait time Setting range: 0.0~20.0s Default value: 0.5s

0：Disabled
1：Regular start
2：Start in the mode of rotation speed tracking
This function decides whether the inverter will start running automatically or not and the wait time for auto running in different control modes when the inverter is electrified after power failure.
Select "0", the inverter will not run automatically when it is energized after power failure.
Select "1", if starting criteria permits, the inverter will restart automatically at the initial frequency in the time set by F2.15 when it is energized after power failure.
Select "2", if starting criteria permits, the inverter will restart automatically by way of rotation speed tracking in the time set by F2.16 when it is energized after power failure.
During the period of waiting for restarting, it is invalid to input any operating commands. For example, the inverter will automatically abort restarting by rotation speed tracking and restore to the status of normal stop if stop command is given during this period.

HAZARD

• If the power off restart Function (restart after instantaneous power failure) is selected, it may cause unanticipated sudden restart once the power switches on, which may result in heavy loss of property, serious injury or death to personnel in some cases, eg., the inverter restarts due to disconnection of input power supply undone before performing a mechanical load maintenance. DO put a warning sign like "KEEP CLEAR" or "HAZARD" in an eye-catching place before the equipment to avoid sudden restart of the equipment.

F2.17 Failure self-resetting times Setting range: 0~10 Default value: 0
F2.18 Failure self-resetting interval time Setting range: 0.5~25.0s Default value: 3.0s

The function of failure self-resetting indicates the failure arising from load fluctuation or other causes can reset automatically as per set times and interval. During the process of self-resetting, the inverter will restore operation by way of rotation speed tracking and restarting. When the self-resetting times are set to "0", self reset is disabled and failure protection should be done immediately. This function is invalid for failure protection caused by overload or over heat.

F2.19 JOG operation frequency Setting range: 0.00~400.00Hz Default value: 10.00Hz
F2.20 JOG acceleration time Setting range: 0.1~3600.0s Default value: as per spec.
F2.21 JOG deceleration time Setting range: 0.1~3600.0s Default value: as per spec.

F2.19~F2.11 are relevant parameters set for jogging operation, as shown in Fig. 6-6, in which t1 indicates the actual JOG acceleration time, t2 indicates the JOG time, t3 indicates the actual JOG deceleration time and f1 indicates the JOG running frequency.

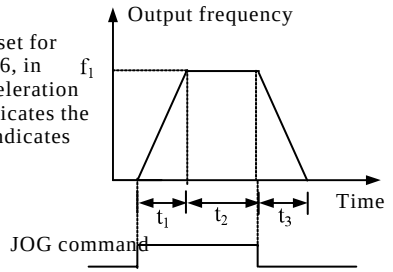


Fig.6-6 Jog Operation Frequency and Acceleration/Deceleration Time

Tips

- Jog operation begins if F2.00=0 and stops if F2.11=0 according to the starting mode.
- JOG control can be performed by the operator panel, control terminals and COM ports.
- Propriety is always given to JOG frequency operation when pressing the JOG key in any operation states.

F2.22 Acceleration time 2	Setting range: 0.0~3600.0s	Default value: as per spec.
F2.23 Deceleration time 2	Setting range: 0.0~3600.0s	Default value: as per spec.
F2.24 Acceleration time 3	Setting range: 0.0~3600.0s	Default value: as per spec.
F2.25 Deceleration time 3	Setting range: 0.0~3600.0s	Default value: as per spec.
F2.26 Acceleration time 4	Setting range: 0.0~3600.0s	Default value: as per spec.
F2.27 Deceleration time 4	Setting range: 0.0~3600.0s	Default value: as per spec.

F2.22~F2.27 are the acceleration/deceleration time controlled by the inverter's external terminals through selecting "4" and "5" of the multi-function terminal X1~X6 (F4.00~F4.05).

F2.28 1st stage speed operation frequency	Setting range: 0.00~upper limiting frequency	Default value: 5.00Hz
F2.29 2nd stage speed operation frequency	Setting range: 0.00~upper limiting frequency	Default value: 10.00Hz
F2.30 3rd stage speed operation frequency	Setting range: 0.00~upper limiting frequency	Default value: 20.00Hz
F2.31 4th stage speed operation frequency	Setting range: 0.00~upper limiting frequency	Default value: 30.00Hz
F2.32 5th stage speed operation frequency	Setting range: 0.00~upper limiting frequency	Default value: 40.00Hz
F2.33 6th stage speed operation frequency	Setting range: 0.00~upper limiting frequency	Default value: 45.00Hz
F2.34 7th stage speed operation frequency	Setting range: 0.00~upper limiting frequency	Default value: 50.00Hz

The above parameters are used to set 1st~7th stage frequency of programmable/multi-stage speed operation. Refer to parameter F7.00 for details.

F2.35 Remain		
F2.36 Leap frequency 1	Setting range: 0.00~upper limiting frequency	Default value: 0.00Hz
F2.37 Range of leap frequency 1	Setting range: 0.00~10.00Hz	Default value: 0.00Hz
F2.38 Leap frequency 2	Setting range: 0.00~upper limiting frequency	Default value: 0.00Hz
F2.39 Range of leap frequency 2	Setting range: 0.00~10.00Hz	Default value: 0.00Hz
F2.40 Leap frequency 2	Setting range: 0.00~upper limiting frequency	Default value: 0.00Hz
F2.41 Range of leap frequency 2	Setting range: 0.00~10.00Hz	Default value: 0.00Hz

The purpose of setting F2.36~F2.41 is to avoid point of resonant frequency of mechanical load so that the three points of leap frequency of the inverter can be set. If the leap range is set to "0", then no leap function performs at corresponding points of leap frequency.
The inverter's output frequency can act leap operation near some frequency points, as shown in Fig.6-11.

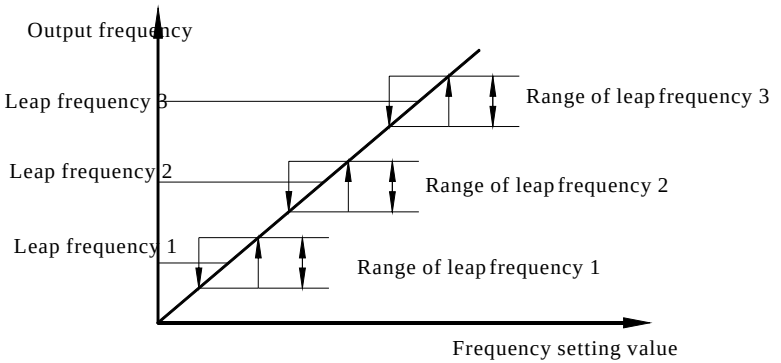


Fig.6-11 Leap Frequency Setting

Tips

- During accelerating and decelerating operation, the inverter can not skip leap frequency.
- Do not set two leap frequency ranges overlaid or inlaid.

F2.42 Carrier frequency	Setting range: 1.0~15.0KHz	Default value: as per spec.

This function is used to set the carrier frequency of the inverter's output PWM wave and should be properly regulated. The maximum value of carrier frequency is determined in accordance with power specifications. Refer to Fig.6-8 for details on carrier frequency value, electromagnetic noise, leakage current and heating conditions.

Carrier frequency	electromagnetic noise	Leakage current	Heating value	Interference
1. 0KHz ↕ 15. 0 KHz	High ↕ Low	Low ↕ High	Low ↕ High	Low ↕ High

Fig.6-8 Carrier Frequency Diagram

Cautions

1.Due to rich ultra harmonics existed in output current, under setting of carrier frequency will result in distortion of the waveform of output current, which may cause larger noise of motor, but less loss and lower temperature rise instead.
2.Increasing the setting value for carrier frequency can reduce noise of the motor, but the inverter's temperature will rise due to greater loss of power elements. If the carrier frequency value is higher than factory default setting, then the inverter shall be derated before use.

F2.43 PWM adaptive control	Setting range: 0~1	Default value: 1

0：Fixed carrier
The carrier does not change as the output frequency changes.
1：Auto carrier regulation
The carrier will automatically make adaptation when there is some change in frequency to improve the pulse of low frequency torque.

Group F3 User Management Interface Parameters

F3.00 LCD Language Selection	Setting range: 0~1	Default value: 0

This function is used to set languages on operator panel. It is valid only for LCD display keyboard.
1：Chinese
2：English （Remain temporarily）

F3.01 Parameter Initializing	Setting range: 0~2	Default value: 0

0：No operation.
This indicates the inverter is in the normal state of data reading and writing.
1：Restore to default setting.
All the parameters in the parameter group F0~FA will restore to the default value.
2：Clear failure records.
This will clear all the history failure records.

Caution

• When F3.01=1, it is invalid for key control parameter F0.00, F0.01, F0.04 and F0.10, which can be modified by hand only. This function will remove all the results received from motor parameter self-learning. If vector control mode is set, then self-learning shall be performed again.

F3.02 Parameter Write Protection	Setting range: 0~2	Default value: 0

This is used to set parameters' modification rights with detailed setting as follows:
0：All the parameters are allowed to be modified but some parameters can not be modified during operation.
1：Other parameters are not allowed to be modified except digital frequency setting and this parameter.
2：Other parameters are prohibited to be modified except this parameter.

F3.03 Remain
F3.04 Selection of monitoring parameter 1 Setting range: 0~18 Default value: 0
F3.05 Selection of monitoring parameter 2 Setting range: 0~18 Default value: 1

This function is used to set the display contents on LED and LCD when the inverter is just energized. Monitoring parameter 1 is displayed on LED and monitoring parameter 2 is displayed in the upper left corner of LCD.
0: Current output frequency 1: Current setting frequency
2: Output current 3: Output voltage
4: Motor rotary turns 5: Operation linear velocity
6: Setting linear velocity 7: DC bus bar voltage
8: Input voltage 9: PID setting value
10: PID feedback value 11: Analog input AVI
12: Analog input ACI 13: Impulse input frequency
14: Input terminal state 15: Radiator temperature
16: Power rate module temperature 17: Current counter value
18: Setting Counter value

F3.06 Linear velocity coefficient Setting range: 0.01~100.0 Default value: 1.00
F3.07 Closed loop display coefficient Setting range: 0.01~100.0 Default value: 1.00

F3.06 is used to correct the display error of linear velocity. It has no influence on actual rotation speed. The calculation formula is shown below:
Linear velocity＝Frequency ×Linear velocity coefficient

F3.07 is used to correct the display error of PID set quantity or feedback quantity (voltage/current). It has no influence on closed loop PID regulation. The calculation formula is shown below:
Displayed PID feedback/setting value＝Closed loop display coefficient × actual PID feedback/setting value.

F3.08 Software edition Setting range: 0.01~99.99 Default value:-
F3.09 Acceleration/Deceleration time unit Setting range: 0~1 Default value: 0

0: Second
1: Minute
This is used to set the unit for acceleration/deceleration time with default setting of "second".

Group F4 On-off Input/Output Parameters

F4.00 Selection of input terminal X1 Setting range: 0~30 Default value: 0
F4.01 Selection of input terminal X2 Setting range: 0~30 Default value: 0
F4.02 Selection of input terminal X3 Setting range: 0~30 Default value: 0
F4.03 Selection of input terminal X4 Setting range: 0~30 Default value: 0
F4.04 Selection of input terminal X5 Setting range: 0~30 Default value: 0
F4.05 Selection of input terminal X6 Setting range: 0~30 Default value: 0

External input terminal X1~X6 are multi-function input terminals. By setting the value for F4.00~F4.05, the function of X1~X6 can be selected. Refer to below for detailed setting value and function.
0: No function
1: Multi-stage speed selection 1
2: Multi-stage speed selection 2
3: Multi-stage speed selection 3
The ON/OFF pair selected by multi-speed operation at Stage 1～3 can define maximal 7 speed stages. Multi-stage speed control terminals are selected by the parameter F4.00~F4.05. multi-speed control of external terminals can be operated together with RUN command. The multistage speed of terminal control is shown in Table 6-2.

Multi-stage speed 3	Multi-stage speed 2	Multi-stage speed 1	Multi-stage speed selection
OFF	OFF	OFF	Stage 0: The operation frequency is set by F0.03.
OFF	OFF	ON	Stage 1: The operation frequency is set by F2.28.
OFF	ON	OFF	Stage 2: The operation frequency is set by F2.29.
OFF	ON	ON	Stage 3: The operation frequency is set by F2.30.
ON	OFF	OFF	Stage 4: The operation frequency is set by F2.31.
ON	OFF	ON	Stage 5: The operation frequency is set by F2.32.
ON	ON	OFF	Stage 6: The operation frequency is set by F2.33.
ON	ON	ON	Stage 7: The operation frequency is set by F2.34.

Note: OFF indicates it is connected with the terminal COM;
ON indicates it is disconnected with the terminal COM.

Table 6-2 Multi-speed selection

4：Acceleration/Deceleration time 1 5: Acceleration/Deceleration time 2
It is used for external terminal's selection of acceleration/deceleration time, which has four combined groups as shown in Table 6-3.

Acceleration/ Deceleration time 2	Acceleration/ Deceleration time 1	Multi-stage speed selection
OFF	OFF	Acceleration/Deceleration time 1
OFF	ON	Acceleration/Deceleration time 2
ON	OFF	Acceleration/Deceleration time 3
ON	ON	Acceleration/Deceleration time 4

Table 6-3 Acceleration/Deceleration Time Selection

6：Frequency path selection 1； 7：Frequency path selection 2； 8：Frequency path selection 3
If frequency input path is external terminal selection (F0.01=8), the inverter's frequency setting path is determined by the state of three terminals. Refer to Table 6-1 for correlation.

9：FRD JOG control； 10：REV JOG control
9 and 10 are used to perform FRD/REV JOG control in the mode of external terminal control. FRD JOG control is always prior to REV JOG control. If they close simultaneously, then FRD JOG control is valid.

11：Free stop control
This is used to free stop control under the mode of external terminal control. The inverter will perform free stop when it is closed and start in the mode of rotation speed tracking when it is open.
12：Frequency UP Command
13：Frequency DOWN Command
Commands of 12 and 13 are used to realize control over frequency up or down, and proceed remote control through operator panel.
14：External Failure Input
This terminal paves the way for the inverter to keep an eye on external equipment failure by inputting failure signals of external equipment.
15：Three-wire operation control
Refer to the parameter F4.08.
16：DC braking command
DC braking command is used to apply DC braking on the motor during stop, to realize emergency shut-down and accurate positioning of the motor. See the parameter F2.12~F2.14 for details.

17：Counter zero-clearance input
Once this function is set, connect this terminal with COM terminal and the counter value will be "0".
18：Counter pulse signal input
This is used to receive external pulse signal which is served as the count value. This function can be set only by the multifunction terminal X6.
19：External pulse signal input
This is used to receive external pulse signal which is served as frequency setting. This function can be set only by the multifunction terminal X6.
20：External reset input
When failure alarm occurs, this terminal is used to perform failure reset of the inverter. This function is in accord with STOP key on the operator panel.
21：UP/DOWN terminal frequency clear
If frequency feeding path is set to UP/DOWN terminal control that are valid, then the operation frequency can be removed directly through this function.
22：PID operation input
When PID input mode is terminal control, PID operation will be valid if this terminal is valid.
23：Programmable multi-stage speed operation input
When the input mode of programmable multi-stage speed operation (PLC) is terminal control, PLC input operation will be valid if this terminal is valid.
24：Wobble operation input
When the wobble input mode is terminal control, the wobble operation will be valid if this terminal is valid.
25：Wobble state reset
If this function is selected, no matter what kind of input it is, auto or hand-operated, close this terminal, the wobble state info kept inside the inverter will be cleared; disconnect this terminal, the wobble will restart.
26：External stop command
This command is valid for all the operation command paths. If this terminal is valid, the inverter will shut down according to the mode set by F2.11.
27：Inverter operation disable command
If this terminal is valid, the inverter in operation will perform free stop. If the inverter is in the state of halting, then starting is disabled. This function is mainly applied to the occasion that safe linking is needed.

28：Inverter acceleration/deceleration disable command

If this terminal is valid, the inverter will not be influenced by any external signals (except the stop command) and remain running at current rotating speed.

29：Command shifts to terminal

If this terminal is valid, the operation command path will shift to the path of terminal operation command forcefully, and restore to the original operation command path if it is disconnected.

30：Frequency shifts to ACI

If this terminal is valid, the frequency feeding path will shift to ACI feeding forcefully and restore to the original frequency feeding path if it is disconnected.

Caution

• 18 and 19 are valid only for multi-function terminal/port X6. The maximum frequency of input pulse is 20KHz with low power level of 0v and high power level of 18~26V.

F4.06 FRD/REV terminal control mode	Setting range: 0~3	Default value: 0

This function is used to select four operation modes of the inverter controlled by external terminals.

0：Two-wire control mode 1

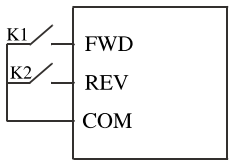
Shown in Table 6-4 and Fig.6-13.

1：Two-wire control mode 2

Shown in Table 6-4 and Fig.6-13.

Table 6-4 Two-Wire mode control running command sheet

ON/OFF state		Two-wire control 1	Two-wire control 2
K2	K1	Operation command 1	Operation command 2
OFF	OFF	Stop	Stop
ON	OFF	REV	Stop
OFF	ON	FRD	FRD
ON	ON	Stop	REV



ig.6-9 Two-wire Control 1/2 Wiring Diagram

ON stands for "switching on" and OFF stands for "switchtting off".

2：Three-wire control mode 1

Three-wire control is shown in Fig.6-14, in which Xn stands for three-wire operation control terminal which can be any of the multi-function input terminal X1~X6 (refer to parameter F111~F116) by selecting "15".

SK1---FRD switch

SK2---Stop switch

SK3---REV switch

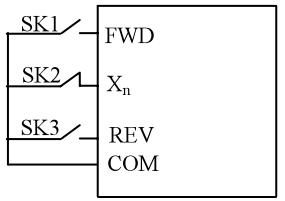


Fig.6-14: Three-wire control wiring diagram

3：Three-wire control mode 2 (remain)

F4.07 Open collector output terminal Y1 setting	Setting range: 0~15	Default value: 0
F4.08 Open collector output terminal Y2 setting	Setting range: 0~15	Default value: 1
F4.09 Programmable relay output setting	Setting range: 0~15	Default value: 12

This set of parameters defines the contents of open collector output terminal Y1 and Y2, and the contents indicated by the relay.

0：Inverter "in operation" signal:

This indicates the outlet indication signal of the inverter in the state of operation.

1：Frequency arrival (FAR) signal:

Refer to the function declaration of F4.12.

2：Frequency level detection (FDT) signal:

Refer to the function declaration of F4.10.

3：Inverter null revolution "in service" instruction:

This indicates the indication signal outlet by the inverter is still in the state of operation though the output frequency of the inverter is 0.00Hz.

4：External failure stop

When failure signal of external equipment is received through input terminal, the inverter will perform trip alarm and the terminal "Y" outlets indication signal.

5：Upper limit of output frequency arrival:

This refers to the indication signal of the inverter output by the inverter when the running frequ reaches the upper limit of frequency.

6: Lower limit of output frequency arrival
This refers to the indication signal output by the inverter when operation frequency reaches the lower limit of frequency.
7: PLC multistage running one cycle ends:
When a PLC multi-speed operating cycle is finished, a valid low power level pulse signal will be output at this port (signal width: 500ms).
8: Inverter overload alarm signal:
When the inverter's output current exceeds overload alarm level, an effective low power signal will be output after waiting for a preset alarm delay period.
9: Inverter is getting ready for power on
If the inverter is ready for power switching on, in other words, the inverter has no failure in it, the bus bar is normal and the inverter's operation terminal disabled is invalid which means the inverter can accept the operation command and start, then the instruction signal will outlet at this port.
10: Counter detection signal output
Refer to the function description of F4.16.
11: Counter reset signal output
Refer to the function description of F4.15.
12: Inverter failure
If the inverter stops running due to fault in it, then failure signal will be output.
13: Inverter under-voltage lockout:
When DC bus voltage is lower than the set level of under voltage, LED displays "P.oFF" and the terminal "Y" outputs indication signal.
14: Wobble frequency upper / lower limit
When wobble function is selected, if the wobble frequency fluctuation range reckoned from central frequency is beyond the upper limiting frequency or lower than the lower limiting frequency F0.07, this indication signal will be outlet, as shown in Fig.6-11.

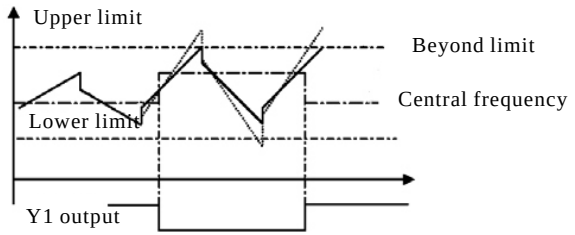


Fig.6-11 Diagram of Wobble Operation Upper/Lower Limit

15: PLC multistage operation ends:
When a PLC multi-speed operating cycle is finished, a valid low power level pulse signal will be output at this port with signal width of 500ms.

F4.10 FDT level Setting range: 0.00Hz~upper limit frequency Default value: 10.00Hz
F4.11 FDT lagged value Setting range: 0.00~30.00Hz Default value: 1.00Hz

This set of parameters is applied to set the frequency detection level. If the output frequency rises and exceeds the setting value of FDT, then open collector signal (low power level) will be output; if the output frequency falls to the FDT removal of power level, then invalid signal (high resistance) will be output, as shown in Fig.6-12.

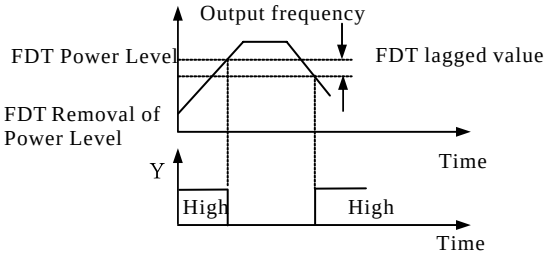


Fig. 6-16 Frequency Level Detection Diagram

F4.12 Frequency Arrival Checkout Range (FAR) Setting range: 0.00~15.00Hz Default value: 5.00Hz

If the inverter's output frequency is within the range of positive/negative checkout range of the set frequency, the selected output terminal will output valid signal (low power level), as shown in Fig.6-17.

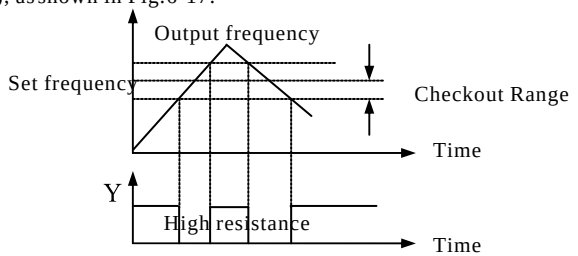


Fig.6-13 Frequency Arrival Checkout Diagram

F4.13 Overload Pre-alarm Level	Setting range: 20~120%	Default value: 100%
F4.14 Overload Pre-alarm Action Time	Setting range: 0.0~15.0s	Default value: 1.0s

Overload pre-alarm level defines the current threshold of overload pre-alarm action. Its setting range is the percentage in respect to rated current. Generally, the overload pre-alarm level should be set lower than overload protection level.

If the output current reaches the overload pre-alarm level and its durative level exceeds the set time of overload pre-alarm action, then overload pre-alarm acts, as shown in Fig. 6-18.

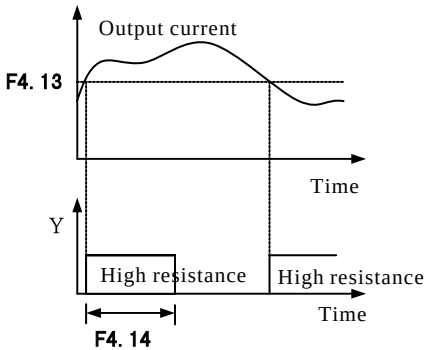


Fig.6-18 Diagram of Overload Pre-alarm Action

F4.15 Counter reset setting	Setting range: detection value ~60000	Default value: 1
F4.16 Counter detection value setting	Setting range: 0~reset value	Default value: 1

This parameter group stipulates counting work of the counter. The pulse of counter is input by the external terminal X6. When the counting value for external pulse reaches the value set by F4.15, the corresponding multi-function export terminal (counter reset signal output) will outlet an effective cycle signal with width of 500ms and then clear the counter value.

When the counting value reaches the value set by F4.16, the corresponding multi-function export terminal (counter detection signal output) will outlet an effective cycle signal. If the counter continues to count and the value surpasses the value set by the parameter F4.16, this effective signal will be cancelled when the counter is cleared.

In Fig.6-15, Y1 is set to be a reset signal, Y2 is set to be a detection signal output, F4.15 is set to 8 and F4.16 is set to 5.

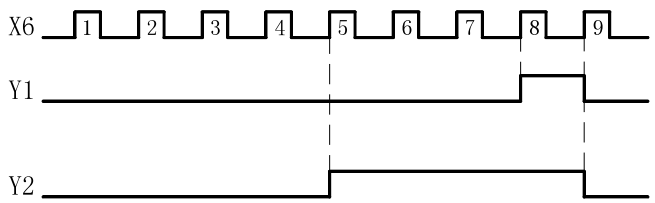


Fig.6-15 Diagram of Counter Reset Value Setting and Detection Value Setting

Group F5 Analog Input/Output Parameters

F5.00 AVI input lower limit voltage Setting range: 0.0V~upper limit voltage Default value: 0.0V
F5.01 AVI input upper limit voltage Setting range: Upper limit voltage~10.0V Default value: 10.0V

F5.00 and F5.01 are applied to set the maximum and minimum values for external analog input voltage AVI, which should be set in accordance with actual situation of input signals.

F5.02 ACI input lower limit current Setting range: 0.0mA~upper limit current Default value: 0.0mA
F5.03 ACI input upper limit current Setting range: Lower limit current~20.0mA Default value: 20.0mA

F5.02 and F5.03 are applied to set the maximum and minimum values for external analog input current ACI, which should be set in accordance with actual situation of input signal.

TIP

Generally, ACI port is used as current input port. If necessary, it can be used as voltage input port, which can be selected through a jumper on the control panel.
Their correlation can be converted as 20mA=10.0V.

F5.04 Pulse input lower limit frequency Setting range: 0.0~upper limit frequency Default value: 0.0KHz
F5.05 Pulse input upper limit frequency Setting range: Lower limit frequency~20.0KHz Default value: 10.0KHz

F5.04 and F5.05 are applied to set the maximum and minimum values for external input pulse, which should be set in accordance with actual situation of input signal.

F5.06 Minimal input corresponding frequency Setting range: 0.00~upper limit frequency Default value: 0.00Hz
F5.07 Maximum input corresponding frequency Setting range: 0.00~upper limit frequency Default value: 50.00Hz

This set of parameters is used to set the correlation between external analog input quantity and the set frequency. The relationship between set frequency and frequency setting signal after treatment of filtering and gain is shown in Fig.6-20. These two kinds of signals can realize the characteristics of direct action and reaction separately. f_{max} and f_{min} in this figure refer to the frequency corresponding to the upper limit of input and the lower limit of input respectively.

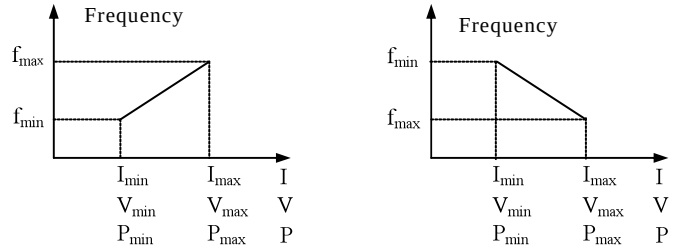


Fig.6-16 Relation Curve of Input Quantity against Setting Frequency

F5.08 Analog input signal delay period Setting range: 0.1~50.0s Default value: 0.5s

This parameter is used to regulate the delay period of analog input signal.

F5.09 Multi-function analog output AFM Setting range: 0~7 Default value: 0
F5.10 Multi-function digit output DFM Setting range: 0~7 Default value: 2

This function is used to select output signal at the analog output port AFM and digital output port DFM.

Output frequency
AFm:(0~AFM Upper limit value)=(0.00~Upper limit frequency)
DFm:(0~DFM Upper limit value)=(0.00~Upper limit frequency)
1:Setting frequency
AFm:(0~AFM Upper limit value)=(0.00~Setting frequency)
DFm:(0~DFM Upper limit value)=(0.00~Setting frequency)
2: Output current
AFm:(0~AFM Upper limit value)=(0.00~2 times for rated current)
DFm:(0~DFM Upper limit value)=(0.00~2 times for rated current)
3:Motor rotating speed
AFm:(0~AFM Upper limit value)=(0.00~2 Motor synchronous rotating speed)
DFm:(0~DFM Upper limit value)=(0.00~2 Motor synchronous rotating speed)

4:Output voltage
AFm:(0~AFM Upper limit value)=(0.00~Maximum/Rated output voltage)
DFm:(0~DFM Upper limit value)=(0.00~Maximum/Rated output voltage)
5:Bus bar voltage
AFm:(0~AFM Upper limit value)=(0.00~800V)
DFm:(0~DFM Upper limit value)=(0.00~800V)
6:PID given value
AFm:(0~AFM Upper limit value)=(0.00~10.00V)
DFm:(0~DFM Upper limit value)=(0.00~10.00V)
7:PID feedback value
AFm:(0~AFM Upper limit value)=(0.00~10.00V)
DFm:(0~DFM Upper limit value)=(0.00~10.00V)

F5.11 AFM gain setting Setting range: 20~200% Default value: 100%
F5.12 Remain
F5.13 DFM gain setting Setting range: 20~200% Default value: 100%
F5.14 Remain

Parameter F5.11 defines the upper limit value for analog output AFM. If the default value is 100% and the range of output voltage/current is 0.00~10.00V/0.00~20.00mA, then the voltage and current output will be selected by the jumper.
AFM output =(0~10V/0~20mA) ×F5.11 （Maximum value≤ 10V/20mA）

Parameter F5.13 define the upper limit value for digital output DFM. If the default value is 100%, then the range of output frequency will be 0.0~10.0KHz.
DFM output =(0~10KHz)×F5.13 (Maximum value=20KHz)

F5.15 Combined feed path setting Setting range: 000~666 Default value: 000

This parameter is used to set the frequency feed path.
LED units digit: Operation figure 1
0: Keyboard potentiometer
1: Digital feeding 1
2: Remain
3: Digital feeding 3
4: AVI
5: ACI
6: Digital feeding 2

LED tens digits: Operation figure 2
0: Keyboard potentiometer
1: Digital feeding 1
2: Remain
3: Digital feeding 3
4: AVI
5: ACI
6: Digital feeding 2

LED hundreds digit: Operation figure 3
0: Keyboard potentiometer
1: Digital feeding 1
2: Remain
3: Digital feeding 3
4: AVI
5: ACI
6: Digital feeding 2

LED thousands digit: Remain

F5.15 Combined feed algorithm setting Setting range: 00~54 Default value: 00

This function is used to set the combined feed algorithm.

LED units digit: algorithm 1	LED tens digit: Algorithm 2
0: Addition	0: Addition
1: Subtraction	1: Subtraction
2: Absolute value (subtraction)	2: Absolute value (subtraction)
3: Take the maximal value	3: Take the maximal value
4: Take the minimum value	4: Take the minimum value
5: Operating figure 3 does not participate in algorithm.	

LED hundreds digit: Remain
LED thousands digit: Remain
Parameter F5.15 and F5.16 will be valid only when F0.01=7. Its algorithm formula is shown below:
(Operation figure 1) Algorithm 1 (Operation figure 2) Algorithm 2 (Operation figure 3)
If the tens digit of F5.16 is set to 5, the operation figure 3 will anticipate in algorithm composed of two figures (operation figure 1 and operation figure 2).
Eg.1: If F5.15=534 and F5.16=10, then the algorithm pair will be:
{(AVI + digital feed 3) ACI}
Eg.2: If F5.15=460 and F5.16=21, then the algorithm pair will be:
|(Keyboard potentiometer- digital feed 2) AVI|

TIPS

• Algorithm rule 1: In any case, the algorithm procedure is always like this: operation figure 1 and operation figure 2 participate in algorithm 1 and get the result 1, then put result 1 and operation figure 3 into algorithm 2 and get the final result. If the algorithm result of previous two figures is a negative number, then the default result of the system will be "0".
• Algorithm rule 2: If the general algorithm result is a negative number and algorithm 2 is not an absolute one, then the default result of the system will be "0".

Group F6 PID Function Parameters

F6.00 PID action setting Setting range: 00~11 Default value: 00

LED units digit: Function setting LED tens digit: PID input selection
0: Close 0: Auto input
1: Open 1: Hand-operated input through defined multifunction terminals

LED hundreds digit: Remain
LED thousands digit: Remain

PID regulation function is described below: The built-in PID controller in the inverter detects physical quantity (feedback quantity) through the sensor of the object under control and compares this quantity to the target value of the system. If deviation exists between them, then PID regulation is used to remove deviation. It is a usual process control method used to keep the feedback quantity in accord with the target value. This system structure is as shown in Fig. 6-21.

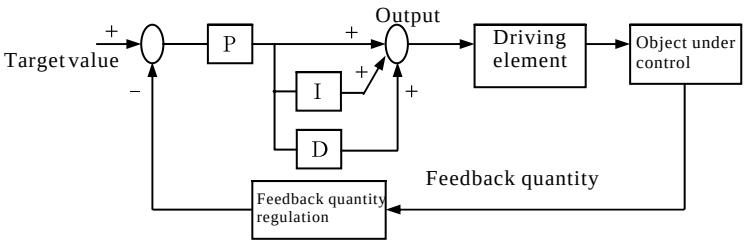


Fig.6-17 PID Control Functional Diagram

F6.01 PID feed path selection Setting range: 0~10 Default value: 1
F6.02 PID feedback path selection Setting range: 4~10 Default value: 4

0: Keyboard potentiometer setting
To set closed-ring feed quantity by the potentiometer on the keyboard.
1: Digital quantity setting
To set the close-ring feed quantity by the target value F6.03.
2: Remain
3: Remain

4: AVI setting

To set the target value by external voltage signal AVI (0~10V).

5: ACI setting

To set the target value by external current signal I (0~20mA).

6: Terminal pulse setting

To set the target value by external pulse.

7: AVI + ACI setting

To set the target value by the algebraic sum of AVI + ACI.

8: AVI - ACI setting

To set the target value by the algebraic difference of AVI - ACI. If AVI ≤ ACI, Ithe result will always be "0".

9: Min {AVI, ACI}

To take the smaller one from AVI and ACI.

10: Min {AVI, ACI}

To take the bigger one from AVI and ACI.

TIP

• Do not set the same value for the feed path and feedback path. Otherwise, the feed quantity will be the same as the feedback quantity without any deviation, resulting in PID's abnormal work. Besides, do not set the feedback path within 0~3, or there will be no meaning.

F6.03 Feed digital setting	Setting range: 0.00~10.00V	Default value: 0.0V

This parameter is used to set the target value (unit: V) controlled by PID when PID target value is selected to be set by digital setting (F6.01=1).
Do take full consideration of the relationship between manometer range and its output feedback signal when setting this parameter in a constant closed-loop water supply system. Generally, its calculating formula is:
Feed digital quantity setting = 10.00V÷ manometer range×required pressure value
Eg. If the manometer range is 12Mpa and required pressure setting value is 6Mpa, then the feed digital quantity setting shall be 6.00V instead of 5.00V.

F6.04 Feedback path gain	Setting range: 0.01~10.00	Default value: 1.00

If the feedback quantity is not in accord with the actual target value, then this parameter can be used to regulate the PID value till it is in accord with the request.

F6.05 Feedback path polarity	Setting range: 0~1	Default value: 0

0: Positive:
This indicates the maximum feedback quantity corresponding to the maximum input signal.
1: Negative:
This indicates the maximum feedback quantity corresponding to the minimum input signal. Refer to Fig.6-22 for details.

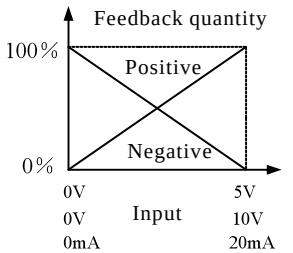


Fig.6-22 Diagram of Feedback Polarity Selection

F6.06 Proportional gain P	Setting range: 0.01~10.00	Default value: 1.00

Proportional gain (P) decides response degree of output frequency to deviation. The greater the P value is, the quicker response is, but excessive value of P may result in oscillation and too low value of P may lead to response lagging.

F6.07 Integral time constant Ti	Setting range: 0.0~200.0s	Default value: 10.0s

Integral time constant decides the proportional relation between output frequency change speed and deviation. The function of integral is to integrate the output value in accordance with deviation to compensate deviation between feedback value and set value. Too long integral time may result in slow response to external disturbance. The shorter the constant time is, the quicker the response speed is, but too short integral time may result in oscillation.

F6.08 Differential time constant Td	Setting range: 0.0~10.0s	Default value: 0.0s

The function of differential is to proportionate output frequency to deviation, and respond timely to abruptly changing deviation. The longer the differential time is, the faster decay of system oscillation arising from proportional action is, but too long differential time may result in oscillation. Vise versa, the shorter the differential time is, the less decay of oscillator is. If F6.08=0.0, differential will be invalid.

F6.09 Sampling period T	Setting range: 0.01~10.00s	Default value: 0.00s

Sampling period refers to the cycle in which the system conducts sampling over feedback quantity. PID regulator makes a calculation in each period of sampling and gets the output value of PID regulation. The longer the sampling period is, the slower the response is. If F6.09=0.00, the sampling period will be finished automatically.

F6.10 Deviation limit	Setting range: 0.0~20.0%	Default value: 0.0%

Deviation limit refers to the maximum value of deviation between feedback quantity and set quantity within allowable range of the system. When the difference (modulus) between feedback quantity and set quantity is lower than this set parameter value, PID controller will be disabled, as shown in Fig. 6-23.
Proper setting of this parameter is of advantage to improve the stability of the output of system which needs to avoid frequent regulation though it has no high requirement on control precision.

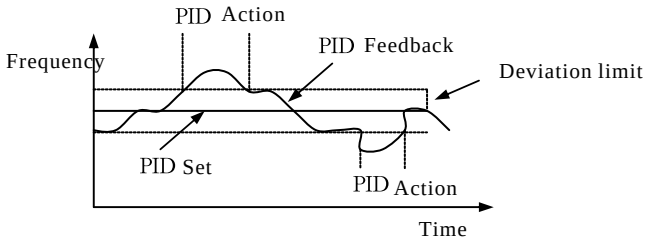


Fig.6-23 Diagram of Deviation Limit Function

F6.11 Closed loop preset frequency Default value: 0.00Hz	Setting range: 0.00~upper limit frequency
F6.12 Closed loop preset frequency holding time Default value: 0.0s	Setting range: 0.0~6000.0s

This parameter defines the inverter's pre-operation frequency and operation time before PID puts into real operation when PID control is enabled. In some control systems, the inverter shall output forcefully a certain frequency value F6.11 to the preset time F6.12 according to this parameter setting so that the controlled object will reach the preset value instantly. PID controller will not put into use until the controlled object approaches the controlling object to raise response speed, as shown in Fig.6-24.

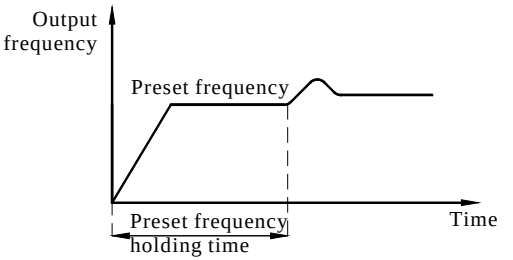


Fig.6-24 Closed Loop Preset Frequency Operation Diagram

F6.13 Sleep threshold	Setting range: 0.00~10.00V	Default value: 10.00V
F6.14 Wake-up threshold	Setting range: 0.00~10.00V	Default value: 0.00V
F6.15 Sleep/ Wake up threshold value check-out time	Setting Range: 0.0~600.0s	Default value: 300.0s

F6.13 indicates the pressure limit of water supply system in the state of sleep. When network pressure is higher than this setting value and the frequency changing the water supply system is adjusted to run at lower frequency, the inverter will automatically enter into the state of sleep (zero speed running) through F6.15. and wait for wake-up.
F6.14 indicates the pressure limit of water supply system when it enters into working state from sleeping state.
When network pressure is lower than the setting value, After the inverter pass the delay time through F6.15. the frequency changing water supply system will automatically shift to working state from sleeping state .as shown in Fig.6-25.

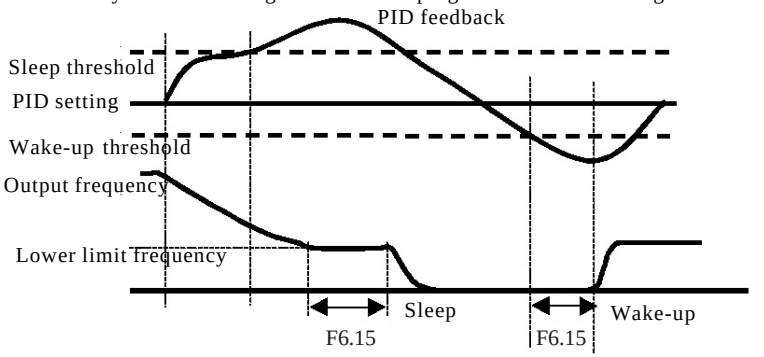


Fig.6-25 Sleep and wake-up function Diagram

Group F7 Programmable Operation Parameters

F7.00 Programmable operation mode selection Setting range: 000~114 Default value: 000

LED units digit: Operation mode selection
0: No action
1: Single cycling
2: Continuous cycling
3: Remain the ultimate value after single cycling
4: Wobble operation

LED tens digit: PLC input mode selection
0: Auto input
1: Input by hand through defined multi-function terminals

LED hundreds digit: Wobble operation input mode
0: Auto input
1: Input by hand through defined multi-function terminals

LED thousands digit: Remain

Description on the functions of operation modes
1: Single cycling
Multi-speed operation of the inverter stops automatically after a cycle and starts only if the operation command is given again. E.g., suppose the operation time at a stage is 0, then the inverter will skip to the next stage directly, as shown in Fig.6-26.

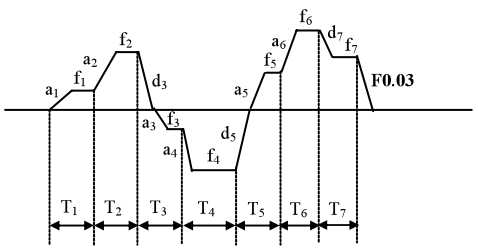


Fig.6-26 Diagram of Programmable/Multi-speed Single-cycle Operation

f1～f7 in this figure refers to the operation frequency at stage 1～7 separately.
T1～T7 refers to the operation time at stage 1～7 separately.
a1～a6 refers to acceleration time at stage 1～6 separately.
d3, d5 and d7 refer to the deceleration time at stage 3, 5 and 7 separately.

2: Continuous cycling:
This indicates the multi-speed operation of inverter recycles repeatedly and stops only if stop command is given, as shown in Fig.6-27.

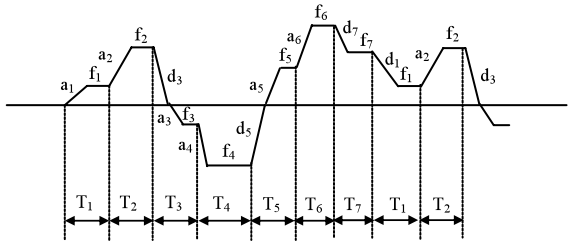


Fig.6-27 Diagram of Programmable/Multi-speed Continuous Cycling Operation

3: Maintaining the ultimate value after singe cycling
After finishing a single cycling, the inverter will run according to the set frequency and direction of the latest multi-speed operation (except stage 0), as shown in Fig.6-28.

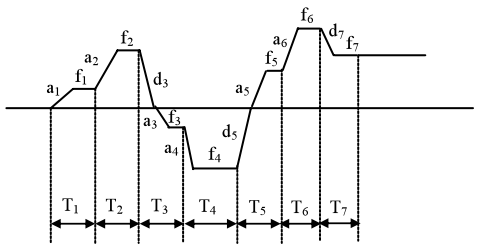


Fig.6-28 Diagram of maintaining the ultimate value after programmable/multi-speed single Cycling Operation

Multi-speed operation time must be longer than the acceleration/deceleration time. This parameter group only defines operation time. So multi-speed acceleration/deceleration time should be converted.

Multi-speed acceleration/deceleration time＝｛（Current multi-speed frequency－initial multi-speed frequency）÷Basic operation frequency｝× acceleration/deceleration time 1(F0.14, F0.15)

Eg. If basic operation frequency is 50Hz, acceleration time is 10s and deceleration time is 20s, then the acceleration time of the system in multi-speed operation operated from 20Hz to 30Hz is:

T1={ (30Hz-20Hz)÷50Hz}× F0.14=2s

The deceleration time when the system operated from 30Hz to 10Hz is:

T1={ (30Hz-10Hz)÷50Hz}× F0.14=8s

4. Wobble Control

The output frequency of the inverter changes periodically during the preset accelerating /decelerating time. This function is especially applied to textile and chemical fiber system in which rotation speed changes due to differential diameter in the front and at the back of a bobbin, as shown in Fig.6-25.

F7.01 1st stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.02 2nd stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.03 3rd stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.04 4th stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.05 5thstage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.06 6th stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.07 7th stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S

F7.01~F7.07 are used to set the time for programmable multi-speed operation.

F7.08 Remain		
F7.09 Multi-speed operation direction 1	Setting range: 0000~1111	Default value: 0000

F7.10 Multi-speed operation direction 2	Setting range: -000 ~ -111	Default value: -000

F7.09~F7.10 are used to set the direction for programmable multi-speed operation. Programmable multi-speed operation is always prior to external terminal control multistage speed.

F7.11 Wobble operation mode	Setting range: 000 ~ 111-	Default value: 000-

LED units digit: Remain

LED tens digit: wobble range control

0: Fixed wobble range

1: Variable wobble range

LED hundreds digit: Wobble stop and start mode selection

0: Start as per the state memorized before shutdown.

1: Restart

LED thousands digit: Wobble status stored or not after power failure

0: Wobble status is stored after power failure.

The status is recovered automatically after power failure and the equipment continues to run at the break point.

1: Wobble status is not stored after power failure.

The inverter restarts its wobble operation after it is started.

F7.12 Wobble preset frequency	Setting range: 0.00~upper limit frequency	Default value:10.00Hz
F7.13 Wobble preset frequency waiting time	Setting range:0.0~3600.0s	Default value: 0.0s

Preset frequency refers to operation frequency of the inverter before it enters into wobble operation or separated from wobble operation. If parameter F7.00=004, the inverter will enter into wobble operation at preset frequency directly after it is started. Then the inverter will enter into the mode of wobble operation after the waiting time for wobble preset frequency is finished. If terminal hand-operated input is selected, F7.13 will be invalid.

If the hundreds digit of the parameter F7.11 is set to "0", then wobble operation will restart after halting, wobble preset frequency will be invalid and the system will run in the state memorized before shutdown. If it is set to "1", then wobble operation will be started after each halting and the frequency will be started at the preset wobble frequency. The thousands digit of F7.11 decides

whether to save previous operation info for wobble start or not when the power is switched on after power failure. If the store is valid, then the hundreds digit of parameter F7.11 decides whether the first start will be started at the wobble preset frequency. If there is a decision not to save the info, then the first operation will be started at the wobble preset frequency once the power is switched on. Besides, the wobble status will be reset by multi-function terminals defined with wobble operation status reset.

F7.14 Wobble amplitude range Setting range: 0.0~50.0% Default value: 10.0%

This parameter refers to the percentage of wobble range. If fixed wobble range is selected, then the actual wobble value will follow the formula below:
Wobble range=F7.14× upper limit frequency
If variable wobble range is selected, then the actual wobble range will follow the formula below:
Wobble range=F7.14×defined frequency setting (wobble center frequency reference F7.18 + F0.01)

F7.15 Kick frequency Setting range: 0.0~50.0% Default value: 0.0%

This parameter refers to the range of quick fall after the frequency reaches the upper limit during the course of wobbulation, or the range of quick rise after the frequency reached the lower limit. The formula is shown below:
Actual trip frequency = F7.15×wobble range

F7.16 Wobble period Setting range: 0.1~3600.0s Default value: 10.0s

This parameter is used to set the period for wobble operation.

F7.17 Time for triangle wave rise Setting range: 0.0~100.0% Default value: 50.0%

This parameter defines the operation time for wobbulation from the lower limit to the upper limit, which is also the acceleration time in a period of wobble operation. Its formula is shown below:
Actual time for triangle wave rise =F7.17×wobble period
It is sure that the difference of time between wobble period and triangle wave rise is the time of fall for triangle wave.

F7.18 Wobble center frequency reference Setting range: 0.00~upper limit frequency Default value: 10.00Hz

This parameter refers to the reference value of wobble center for inverter's output frequency when there is a wobble operation.

The actual wobble center is accumulated value of this parameter value and the setting frequency decided by external frequency setting path F0.01. Its formula is shown below:
Wobble center frequency=F7.18+F0.01 (given path setting frequency)

TIP

• Wobble operation frequency is limited by the upper or lower limit frequency. Improper setting may cause abnormal wobble operation.

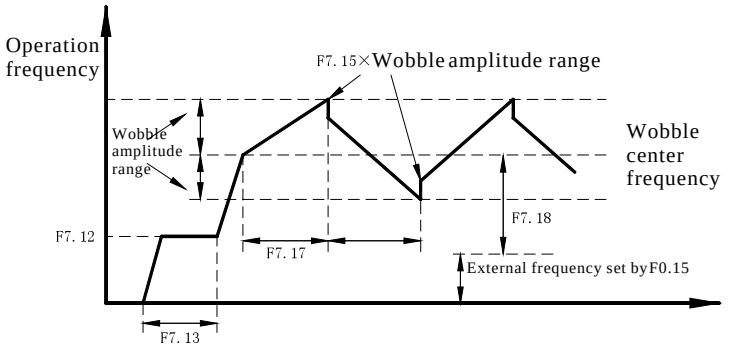


Fig.6-29 Wobble Setting Description

Group F8 Communication Parameters

F8.00 Local address	Setting range: 0~31	Default value: 1

This parameter is used to identify the local inverter's address which is unique when an inverter communicates with other inverters or upper machines through COM port. If this parameter is set to "0", the local inverter under linking control will act as the main station, which decides the operation of other inverters connected to it.
If this parameter is not set to "0", the local inverter will act as a secondary receiving commands and data from the upper machine or the inverter acting as the role of main station. The inverter receives only commands and data from the upper machine or the main station in accord with marked address.

F8.01 Communication config.	Setting range: -000~ -125	Default value: - 013

This parameter defines the baud rate of COM. The data format adopted in the protocol shall be in accord, which is the premise for normal communication.
LED units digit: Baud rate setting
0: 1200BPS
1: 2400BPS
2: 4800BPS
3: 9600BPS
4: 19200BPS
5: 38400BPS

LED tens digit: Data format
0: No parity
1: Even parity
2: Odd parity

LED hundreds digit: Communication failure action selection
0: Shutdown
1: Remain the current state

LED thousands digit: Remain
All the data formats select 1-bit as their starting digit, 8-bit as their data digit and 1-bit as their stop digit.

F8.02 COM over time checkout time	Setting range: 0.0~ 100.0s	Default value: 10.0s

If correct data signal is not received by the local machine within/exceeding the interval defined by this parameter, then communication error will be judged by the local machine. Hence, the inverter will decide whether to stop running or maintain the current state according to the treatment method of communication failure.

F8.03 Local machine response delay time	Setting range: 0~1000ms	Default value: 5ms

This parameter defines the delay time that the local machine delivers the response data frames to the upper machine after the local machine accepts correctly the information codes from the upper machine.

F8.04 Linking proportion setting	Setting range: 0.01~10.00	Default value: 1.00

If local inverter is set to be controlled by master inverter and the setting frequency of local machine is given by the master inverter, then this parameter is used to set weight coefficient of frequency instruction received by the local inverter which acts as a secondary through RS485/232 port. The actual setting frequency of local inverter is equivalent to the product of local parameter value and the frequency setting instruction value received through RS485/232 port.

Group F9 Protection Parameters

F9.00 motor overload protection coefficient Setting range: 30~110% Default value: 105%

If the inverter's driving power rate matches the motor, the motor overload protection coefficient can be set to 100%. If the output current is smaller than or equivalent to 150% of the inverter's rated current at this time, then motor protection is not validated, because inverter's overload protection precedes over action, as shown in Fig.6-30.

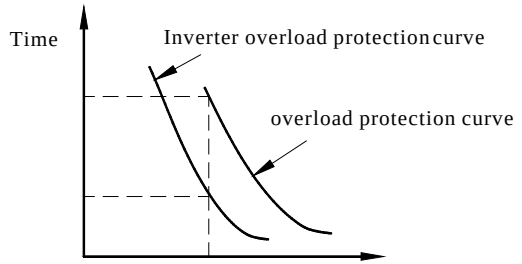


Fig.6-30 Inverter Overload Protection Curve and Motor Overload Protection Curve

If the inverter capacity is larger than the motor capacity, to perform effective overload protection of load motors with different specifications, it is necessary to set proper overload protection coefficient for each type of motor and restrict the maximum current value within the allowable output range of the inverter, as shown in Fig.6-31.

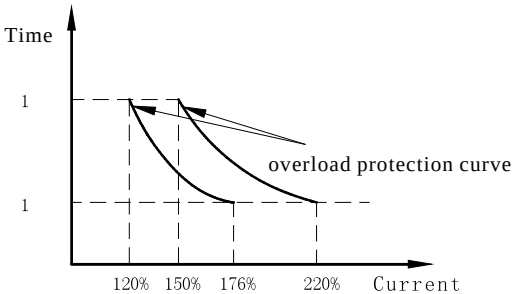


Fig.6-31 Motor Overload Protection Coefficient Setting

The formula for motor protection coefficient is shown below:
Motor overload protection coefficient=Motor rated current ÷ Inverter rated current x100%

F9.01 Under-voltage protection level Setting range: 180~480V Default value: As per spec.

This parameter stipulates the lower limit voltage allowed by DC bus bar when the inverter is in normal operation.

Caution

• If the grid voltage is too low, the output torque of the motor will decrease. As for constant power rate and constant torque load, ultra-low grid voltage will increase the inverter's input or output current. So the inverter should be derated if it is operated at low grid voltage for a long term.

F9.02 Over voltage protection level Setting range: 330~760 Default value: As per spec.

This parameter defines the voltage vector protection threshold of the motor during deceleration. If DC side pump-up voltage inside the inverter excesses the value set by this parameter, the inverter will adjust the deceleration time to delay falling or even stop falling of output frequency. It will not perform the action of deceleration again till the bus bar voltage is lower than the over-voltage limiting level. Shown in Fig.6-32.

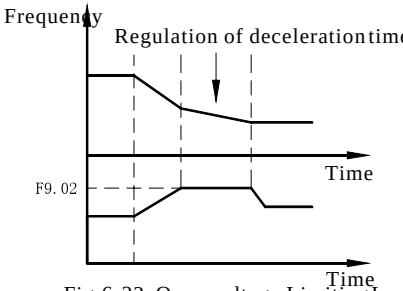


Fig.6-32 Over-voltage Limiting Level Declaration

F9.03 Current limiting level Setting range: 120~220% Default value: 180%

This parameter defines current limiting level. During acceleration, the inverter will adjust its acceleration time automatically when output current of the inverter surpasses the value stipulated by this parameter. When the current falls to this level, just continue to accelerate to target frequency value. During constant speed operation, if the inverter's output current exceeds the value stipulated by this parameter, the inverter will adjust its output frequency to limit the current within the range to avoid current trip. The default setting for this parameter is that the function of auto current limiting is always valid during the whole process.

Group FA Advanced Function Parameters

FA.00 Zero frequency operation threshold Setting range: 0.00~50.00Hz Default setting: 0.00Hz
FA.01 Zero frequency clipping Setting range: 0.00~50.00Hz Default setting: 0.00Hz

This parameter defines frequency's zero characteristic. If analog signal is used to set the frequency, the inverter's output will be interfered due to instability of analog signal. The lagging function of this parameter can be used to avoid fluctuation near zero point, as shown in Fig.6-33. Take the example of analog voltage input path AVI:

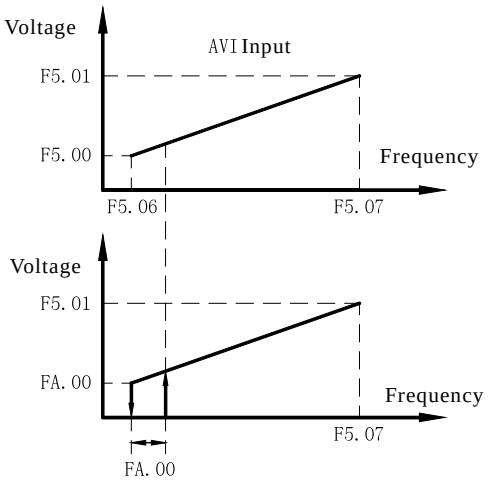


Fig.6-33 Zero Frequency Clipping Operation

Once the operation command is ordered, if the parameter (FA.00, FA.01) is not set, the output frequency will output in strict accordance with the correlation between analog voltage and frequency. Once FA.00 and FA.01 setting is done, if the corresponding input AVI does not reach the frequency A.00+FA.01, the inverter will not run till the corresponding input AVI reaches the frequency FA.00+FA.01. Then the motor will begin the starting and accelerate to the frequency value corresponding to AVI in the preset acceleration time. During deceleration, the inverter will not stop when the frequency reaches FA.00+FA.01. It will stop only when the setting frequency corresponding to AVI reaches or is lower than FA.00. By using this function, inverter's sleep function can be performed and energy-saving can thus be realized.

FA.02 Energy consumption dynamic braking initial voltage Setting range: 300~750V Default setting: As per spec.
FA.03 Energy consumption dynamic braking proportional action Setting range: 10~100% Default setting: As per spec.

This function defines action parameters for inverter's built-in braking units. If the inverter's inside DC-voltage is higher than dynamic braking initial voltage, then the built-in braking units start action. If a braking resistor is connected at the moment, DC voltage will fall after a rise through a braking resistor which releases DC voltage pumping-up inside the inverter. When DC voltage falls to a certain value, the inside braking units of the inverter will shut down.

Dynamic braking proportional action is used to define average voltage value applied onto braking resistors when braking units start action. The braking resistor voltage is the voltage pulse width modulation wave, whose duty ratio is equivalent to braking action ratio. The larger value the proportional action is, the faster the energy releases, the more obvious the effect is and the larger power rate consummated by braking resistors. Therefore, user may set this parameter with full consideration of the braking resistance value, power rate and expected braking effect.

FA.04 Cooling fan control Setting range: 0~1 Default setting: 1

This function is used to control the action of the inverter's built-in cooling fan.
0: Auto control mode
The cooling fan works once the inverter is started and stops automatically if the inverter stops or the radiator temperature is detected to be below 40℃.
1: The fan keeps running once being energized and doesn't stop until power failure.

FA.05 UP/DOWN terminal modification velocity Setting range: 0.01~100.0Hz/s Default setting: 1.00Hz/s

This parameter can regulate the frequency up and down velocity by UP/DOWN Terminal control frequency .

FA.06 Overmodulation enabled Setting range: 0~1 Default setting: 0

This function can raise the output voltage which increases torque output if PWM works in an occasion that the modulation ratio>1, whereas it may increase the harmonic component of output voltage, resulting in waveform variation of current. If the line voltage maintains low (the rated voltage <15%) for a long time, or the motor's output torque is lower than power frequency when the inverter is in the state of operation, i.e., with long-term heavy loads, then this function shall be recommended.

FA.07 Clocking time Setting range: 0~65535s Default setting: 0s

This function is used to set the time for clocking, Compare F4.00~F4.05 with F4.07~F4.09 for use.

Chapter 7 Common Problems, Anomalies and Troubleshooting

7.1 Diagnostic Trouble Codes and Troubleshooting

Table 7-1 Common Error Codes and Solutions

Error Codes	Error Name	Probable Cause(s)	Solution(s)
OC-1	Over current during acceleration	①Excessively short acceleration time; ②Excessively heavy load inertia; ③Over torque lifting or improper V/F curve; ④Power grid voltage below level; ⑤Lower inverter power; ⑥Restart the rotating motor when instantaneous power failure occurred.	①Extend acceleration time. ②Reduce load inertia. ③Reduce torque lifting value or regulate V/F curve. ④Check input power supply. ⑤Replace an inverter with larger power. ⑥Set starting mode selection F2.00 to rotation speed tracing.
OC-2	Over current during deceleration	①Excessively short deceleration time; ②Excessively heavy load inertia; ③Lower inverter power.	①Extend deceleration time. ②Reduce load inertia. ③Replace an inverter with higher power level.
OC-3	Over current while at constant speed	①Abnormal input power supply; ②Load fluctuation; ③Lower inverter power.	①Check input power supply;. ②Reduce load inertia. ③Replace an inverter with higher power level.
OU-1	Over voltage during acceleration	①Abnormal input power supply; ②Restart the rotating motor when instantaneous power failure occurred.	①Check input power supply. ②Set starting mode selection F2.00 to rotation speed tracing.
OU-2	Over voltage during deceleration	①Excessively short deceleration time; ②Existence of load with energy feedback; ③Abnormal input power supply.	①Extend deceleration time adequately. ②Select suitable brake assembly. ③Check input power supply.
OU-3	Over voltage while at constant speed	①Abnormal input power supply; ②Load with energy feedback; ③Abnormal voltage detecting channel.	①Check input power supply. ②Install or reselect brake assembly. ③Seek service.

Error Codes	Error Name	Probable Cause(s)	Solution(s)
OU-4	Over voltage while at stop	①Abnormal input power supply	①Check input power supply.
LU	Under-voltage during running	①Input power supply below level; ②Instantaneous power failure; ③Input power failure; ④DC circuit loose contact; ⑤Bad contact of contactor.	①Check if power supply voltage is below level. ②Reset the inverter and check input power supply. ③ Check if power grid capacity is below level. Verify if power supply voltage is normal. Is there any strong surge current, open phase or short circuit; ④Check the main circuit or seek service. ⑤Check the contactor or seek service.
LP	Input end open-phase	①Open phase of power input end "R", "S" or "T".	①Check input voltage. ②Check installation wiring.
SC	Power module error	①Phase fault or ground fault of three output phases of the inverter; ②Instantaneous over current of the inverter; ③Excess ambient temperature; ④Air channel binding or fan damaged; ⑤DC accessory power supply failure; ⑥Abnormal control panel.	①Check wiring. ②Improve ventilation conditions and reduce carrier frequency. ③Clear up air channel or replace the fan. ④Seek service. ⑤Seek service.
OH	Radiator overheat	①Excess ambient temperature; ②Fan damaged; ③Air channel binding.	①Lower the ambient temperature. ②Replace the fan. ③Clear up air channel or improve ventilation conditions.
OL-1	Inverter overload	①Over torque lifting or improper V/F curve; ②Excessively short acceleration time; ③Overload; ④Power grid voltage below level.	①Reduce torque lifting value or regulate V/F curve. ②Extend acceleration time. ③Replace an inverter with higher power level. ④Check power grid voltage.

Error Codes	Error Name	Probable Cause(s)	Solution(s)
OL-2	Motor overload	①Over torque lifting or improper V/F curve; ②Power grid voltage below level; ③Motor stalled or excessive load fluctuation; ④Improper setting of the motor's overload protection coefficient.	①Reduce torque lifting value or regulate V/F curve. ②Check power grid voltage. ③Check loads and motor's status. ④Set proper overload protection coefficient F9.00 of the motor.
EF	External equipment failure	①Close of fault input terminal of external equipment.	①Disconnect fault input terminal of external equipment and clear failure.
CE-1	COM communication error	①Improper setting of baudrate; ②Communication failure due to interference at serial port; ③No communication signal of the upper machine.	①Adjust baud rate. ②Check the communication cable and take anti-interference measures. ③Check if the upper machine runs normally and the communication cable is disconnected.
CE-2	Remain		
CE-3	Current detection error	①Damaged hall elements or circuit failure; ②DC accessory power supply failure.	①Seek service. ②Seek service.
CE-4	Panel communication failure	①Circuit failure of patch panel and control panel; ②Loose connection of terminals.	①Seek service. ②Check and re-connect.
CPU	CPU error		①Seek service.

7.2 Anomalies and Solutions

Table 7-2 Anomalies and Solutions

Anomalies		Solutions
No display when the power is ON;	①Power grid voltage below level or open phase; ②DC accessory power supply failure; ③Charging resistor damaged.	①Check power grid voltage. ②Seek service. ③Seek service.
Power trip;	①Short circuit in the inverter's input side; ②Exiguous air switching capacity.	①Check wiring or seek service. ②Expand air switching capacity.
Motor doesn't run;	①Incorrect wiring; ②Error setting of operation mode; ③Overload or motor stalled.	①Check wiring. ②Reset the operation mode. ③Reduce loads or regulate motor's status.
Motor reverses;	①Error phase sequence of motor wiring.	① Swap random two phases of the output terminals U, V and W.
Motor acceleration /deceleration failed;	①Improper setting of acceleration/deceleration time; ②Under setting of over-current stall points; ③Over-voltage stall prevention enabled; ④Improper setting of carrier frequency or oscillation occurred; ⑤Overload.	①Reset acceleration/deceleration time. ②Increase setting value for over-current stall point. ③Extend deceleration time or reduce load inertia. ④Reduce carrier frequency. ⑤Reduce load or replace an inverter with higher power level.
Motor's speed fluctuates while at constant speed.	①Excessive fluctuation of loads; ②Under setting of motor's overload protection coefficient; ③Loose contact of frequency setting potentiometer.	①Reduce load fluctuation. ②Increase overload protection coefficient. ③Replace the potentiometer or seek service.

Chapter 8Inverter Inspection and Maintenance

8.1 Inspection and Maintenance

The following influences may lead to latent failure of the inverter such as ambient temperature, humidity, dust, vibration, as well as device ageing, wear and other causes of the inverter itself during long-period operation on industrial occasions. So it is necessary to perform daily and periodic inspections and maintenance on the inverter.

8.1.1 Daily Inspection Items

Table 8-1 Daily Check List

Target of Inspection	Check Content	Inspection Cycle	Inspection Method	Criteria	Measuring Instrument
Operating ambient	• Ambient temperature; • Humidity, dust, corrosive gas, oil mist and etc.	Daily	• Thermometer • Scent; • Visual.	• Ambient temperature between -10 to 40℃, no-condensing; • Humidity between 20 to 90%，no dew or special odo	• Thermometer • Hygrometer
Inverter	• Vibration • Heat • Noise	Daily	• Touch the housing; • Aural.	• Stable vibration • Normal temperature • No abnormal noise	
Motor	• Vibration • Heat • Noise	Daily	• Touch the housing; • Aural.	• Stable vibration • Normal temperature • No abnormal noise	
Electric Parameter	• Input voltage • Output voltage • Output current	Daily	• Thermometer	• Each electric parameter is within the rated value.	• Moving-iron voltmeter; • Rectifier voltmeter; • Clip-on ammeter

WARNING

• Make sure that only qualified personnel will perform maintenance, inspection and part replacement.
• Wait at least 10 minutes after turning OFF the input power supply before performing maintenance or an inspection. Otherwise, there is the danger of electric shock.
• Make sure to open the front panel only after the indicator on the control keypad turns OFF and verify the charge indicator at the right side of main loop terminal is OFF after the panel is opened.
• Do use an insulated appliance while performing check and do not operate the equipment with wet hand(s) to avoid unexpected accidents.
• Always keep the equipment clean so that dust and other foreign matter does not enter the inverter.
• Keep electronic equipment away from moisture and oil. Dust, steel filings and other foreign matter can damage the inverter, causing unexpected accidents, so do take special care.

8.1.2 Periodic Inspection Items

Table 8-2 Periodic Inspection Items

Target of Inspection	Inspection Items	Contents of Inspection	Inspection Cycle	Inspection Method	Criterias
Main circuit	Overall	• Check if there is any loose connector or terminal. • Check if there is any device burnt.	Regular	Visual	• No loose connector or loose terminal. • No burnt device.
	Main power module	• Check if it is damaged or not.	Regular	Visual	• No sign of damage.
	Filter capacitance	• Check if there is any leakage. • Check if there is any inflation.	Regular	Visual	• No leakage; • No inflation.
	Contactor	• Check if there is any abnormal sound of actuation. • Check if dust has been cleaned.	Regular	Aural Visual	• Normal sound; • Clean.

Target of Inspection	Inspection Items	Contents of Inspection	Inspection Cycle	Inspection Method	Criterias
Main circuit	Resistor	• Check if there isany big crack. • Check if the coloris abnormal.	Regular	Visual	• No crack. • Normal color.
	Fan	• Check if thereis any abnormal noise or vibration.	Regular	Audio Visual	• Normal sound and stable vibration.
	PCB	• Check if dusthas been cleaned	Regular	Visual	• Neat and clean.
Control circuit	FPC strand socket	• Check if it is loose.	Regular	Visual	• No loose connection.
	Overall	• Check there is any special odor or discoloring. • Check if thereis any crack.	Regular	Scent or audio	• No odor and discoloring; • No crack, smooth surface.
Keyboard	LED	Check if theLED display is normal.	Regular	Visual	Normal and clear.
	Connecting cable strand	• Check if there isany scratch. • Check if it isconnected tightly.	Regular	Visual	• No scratched surface. • No loose connection.

WARNING

• Do not remove or shake the device arbitrarily, nor pull out the connector during inspection. Otherwise, this may result in inverter failure or damage.
• Do not leave any inspection tool (i.e., a screwdriver)) in the machine after periodic check. Otherwise, there is the danger of damage to the inverter.

8.2 Replacement of Wearing Parts

The wearing parts of inverter mainly include cooling fan and filter electrolytic capacitor. Usually, a cooling fan's service life is 20,000~30,000 hours and an electrolytic capacitor's service life is 40,000~50,000 hours. User can decide when to replace these parts according to the corresponding operation time.

1.Cooling Fan
It is advisory to replace the fan when abnormal noise or even vibration occurred to the fan due to bearing wear and fan blade aging. The standard replacement age is 2~3 years.

2. Filter Electrolytic Capacitor
The performance of filter electrolytic capacitor is subject to the pulsating current of main circuit. High ambient temperature or frequent load jump may cause damage to the filter electrolytic capacitor. Generally, every 10℃ rise in temperature may lead to reduction of the capacitor's service life by half (as shown in Fig. 8-1). If there is any electrolytic leakage or safety valve emission, just replace it at once. The standard replacement age for electrolytic capacitor is 4~5 years.

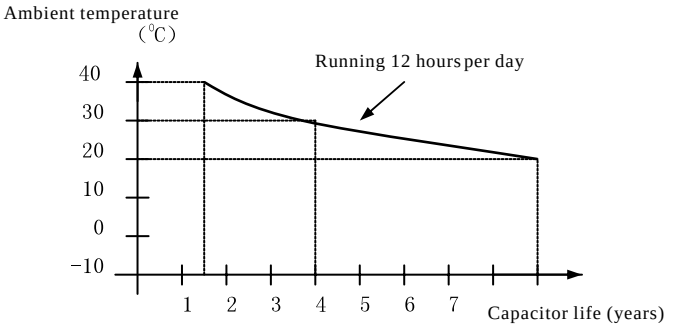


Fig. 8-1 Capacitor Life Curve

3.The above replacement duration for inverter's wearing parts is applied to the following conditions:
• Ambient Temperature: 30℃ averagely all year round;
• Load Proportion: <85%;
• Operation Time: ≤12h/day.
If used beyond the above mentioned range, the service life of the inverter's wearing parts will minimize.

8.3 Storage of Inverter

Please pay attention to the following points if an inverter is set aside or stored for a short/long period:

CAUTION

• DO not keep the inverter in a place with high temperature, humidity, heavy dust, metal shavings, corrosive gas and vibration, and ensure a good ventilation.
• Long-term idle of the inverter may cause decreasing in filter characteristic of the electrolytic capacitor. So it should be recharged within half an year and the recharging period should be at least 5 hours. DO raise the voltage gradually by using a voltage regulator to some rated value before it is recharged. At the same time, check whether the inverter's function is normal or not, whether there is a short circuit caused by some problems. In case the above problems occur, just remove or seek service as soon as possible.

Chapter 9 Outline Dimension & Mounting Dimension

9.1 Inverter Outline Dimensions & Mounting Dimensions

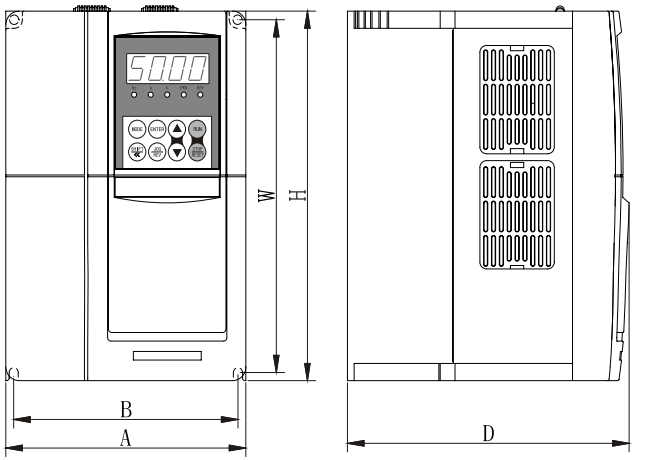


Fig.9-1 Inverter Model A Outline Dimensional Drawings

Inverter Models	Power (KW)	Dimension (MM)						Figure	Gross Weight (kg)
		H	W	A	B	D	d		
ZVF9V-G0007T2/S2	0.75	185	175	118	108	175	Φ4	Figure 9-1	
ZVF9V-G0015T2/S2	1.5								
ZVF9V-G0022S2	2.2								
ZVF9V-G0007T4	0.75								
ZVF9V-G0015T4/P0015T4	1.5								
ZVF9V-G0022T4/P0022T4	2.2								

Inverter Models	Power	Dimension (MM)						Figure	Gross Weight (kg)
		H	W	A	B	D	d		
ZVF9V-G0022T2	2.2	215	205	145	135	178	Φ4	Figure 9-1	
ZVF9V-G0037T2/S2	3.7								
ZVF9V-G0037T4/P0037T4	3.7								
ZVF9V-G0040T4/P0040T4	4.0								
ZVF9V-G0055T4/P0055T4	5.5								
ZVF9V-P0075T4	7.5								
ZVF9V-G0055T2	5.5	265	253	185	174	200	Φ5.5	Figure 9-1	
ZVF9V-G0075T4	7.5								
ZVF9V-G0110T4/P0110T4	11								
ZVF9V-P0150T4	15								

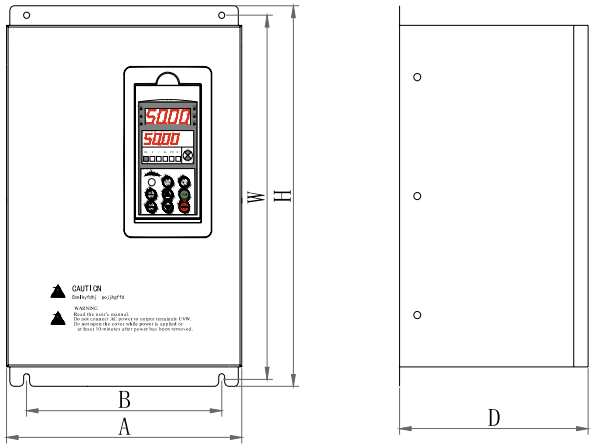


Fig.9-2 Inverter Model B Outline Dimensional Drawings

Inverter Models	Power (KW)	Dimension (mm)						Figure	Gross Weight (kg)
		H	W	A	B	D	d		
ZVF9V-G0075T2	7.5	380	360	210	160	204	Φ10	Figure 9-2	
ZVF9V-G0150T4/P0150T4	15								
ZVF9V-P0185T4	18.5								
ZVF9V-G0110T2	11	470	450	270	206	255	Φ10	Figure 9-2	
ZVF9V-G0150T2	15								
ZVF9V-G0185T4	18.5								
ZVF9V-G0220T4/P0220T4	22								
ZVF9V-G0300T4/P0300T4	30								
ZVF9V-P0370T4	37								
ZVF9V-G0185T2	18.5	630	605	360	270	300	Φ10	Figure 9-2	
ZVF9V-G0220T2	22								
ZVF9V-G0370T4	37								
ZVF9V-G0450T4/P0450T4	45								
ZVF9V-G0550T4/P0550T4	55								
ZVF9V-P0750T4	75								
ZVF9V-G0750T4	75	750	726	470	376	346	Φ12	Figure 9-2	
ZVF9V-G0900T4/P0900T4	90								
ZVF9V-G1100T4/P1100T4	110								
ZVF9V-P1320T4	132								

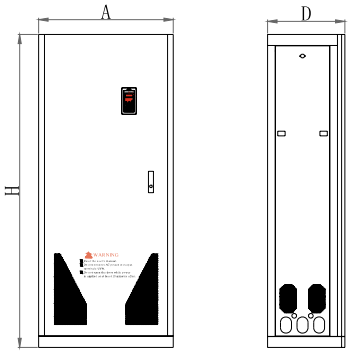


Fig.9-3 Inverter Model C Outline Dimensional Drawings

Inverter Models	Power (KW)	Dimension (mm)						Figure	Gross Weight (kg)
		H	W	A	B	D	d		
ZVF9V-G1320T4	132	1270		574		380		Figure 9-3	
ZVF9V-G1600T4/P1600T4	160								
ZVF9V-G1850T4/P1850T4	185								
ZVF9V-P2000T4	200								
ZVF9V-G2000T4	200	1700		710		410		Figure 9-3	
ZVF9V-G2200T4/P2200T4	220								
ZVF9V-G2500T4/P2500T4	250								
ZVF9V-G2800T4/P2800T4	280								
ZVF9V-P3150T4	315								
ZVF9V-G3150T4	315	2020		750		550		Figure 9-3	
ZVF9V-G3500T4/P3500T4	350								
ZVF9V-G3750T4/P3750T4	375								
ZVF9V-P4000T4	400								

9.2 Operation Panel Outline Dimension and Mounting Hole Dimension

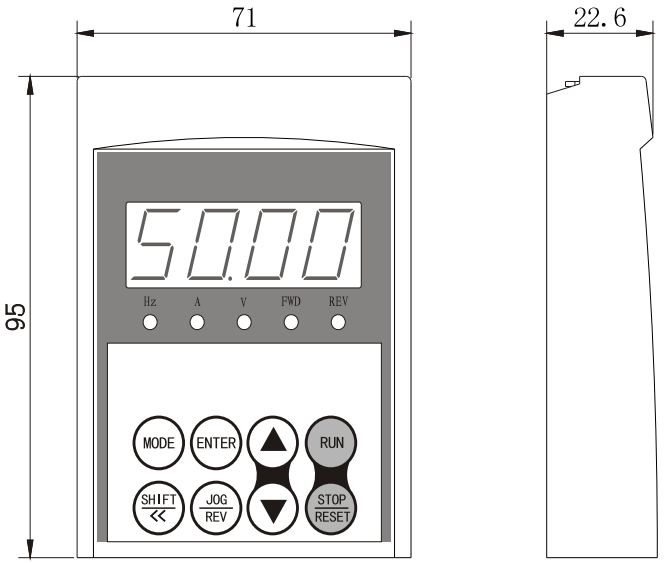


Fig.9-4 ZR04 Operator Panel Dimension

Tips:

• Extra mounting socket shall be assemblied when ZR04 operator panel is pulled out to install.
• The hole dimension of the installation socket is as shown in Fig.9-5.

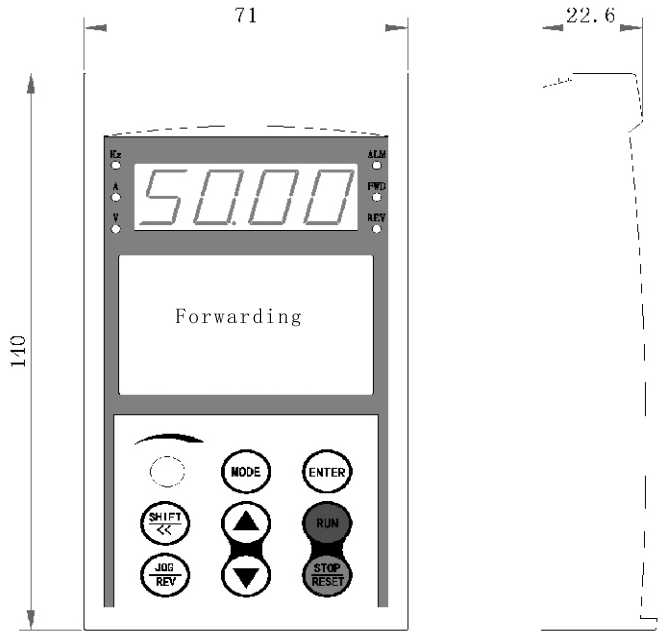


Fig.9-5 ZR05 Operator Panel Dimension

Ips

• Extra mounting socket shall be assembled when ZR05 operator panel is pulled out to install.
• The hole dimension of the installation socket is as shown in Fig.9-6.

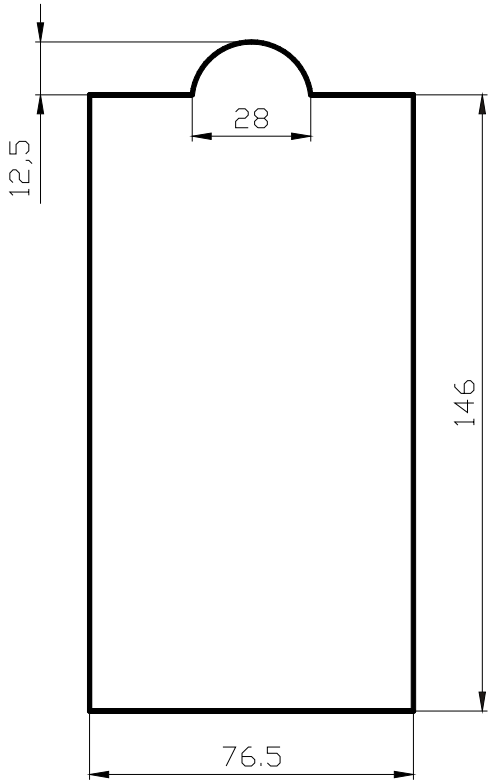


Fig.9-6 ZR Operator Panel Hold Dimension

Chapter 10 Quality Warranty

1. Warranty Period under Normal Conditions
 • We provide guarantees for repair, replacement and return of the purchase in 1 month from the date of use.
 • We provide guarantees for repair and replacement in 3 months from the date of use.
 • We provide guarantee for repair in 12 months from the date of use.
2. If the date of use can not be verified, then the warranty period shall be 18 months from the date of manufacture. Service exceeding the warranty period shall be charged to the purchaser. The purchaser enjoys life-long paid service whenever and wherever he uses an inverter made in our company.
3. Service in the following cases, even within the warranty period, shall be charged to the purchaser:
 • Damage caused by mal-operation in violation of this manual;
 • Damage caused by improper use of an inverter that is off technical standard and requirement;
 • Malfunction or damage caused by fire, earthquake, flood, abnormal input voltage or other natural disasters;
 • Artificial damage caused by unauthorized repair or renovation;
 • Induced failure or aging of the device due to poor ambient;
 • Delayed or unsatisfied payment in violation of purchase appointment;
 • Unidentifiable nameplate, mark and date of manufacture;
 • Malfunction or damage caused by improper transit or storage after purchase;
 • Fail to give an objective description on the use of installation, wiring, operation, maintenance or else;
 • Defective products should be sent to us for repair, replacement and return, which can be proceeded only after verifying the burden of liability.
4. In case there is any quality problem or accident, we merely promise to bear the above-mentioned responsibilities. If a user needs more guarantees for liabilities, please assure on the insurance company voluntarily.

Appendix 1 Optional Parts

All the optional parts can be ordered for with us if needed.

1.Brake Assembly
The brake assembly consists of two parts: braking unit and braking resistor. It is necessary to install a brake assembly on the occasion that quick stop is required though there is a heavy potential load (e.g., elevator) or inertia load.

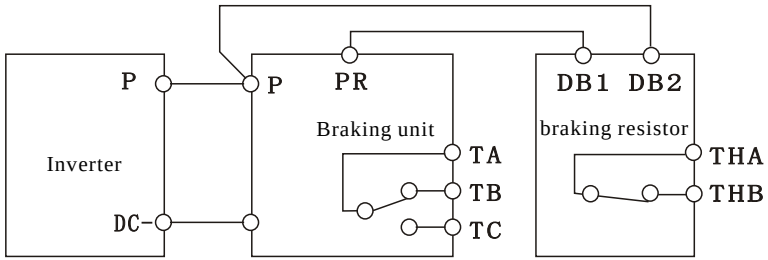


Fig. Appendix 1-1 Brake Assembly Wiring Diagram

TIPS

• Inverter model ZVF9V-G0150T4 or lower has a built-in braking unit. If the braking torque provided by the built-in brake assembly is not enough, external braking resistor can be fitted.
• When installing a brake assembly, DO take into consideration of the safety of the surrounding ambient.
• For detailed parameters and introduction to the function, please refer to **Brake Assembly User's Manual.**

Table Appendix 1-1 Recommended Brake Assembly Matching Specifications

Inverter		Braking unit		Braking resistor		
Voltage	Motor(kw)	Model	Quantity	Recommended resistance value	Resistor specification	Quantity
220V	0.75	Built-in		80W200Ω	80W200Ω	1
	1.5	Built-in		160W100Ω	160W100Ω	1
	2.2	Built-in		300W70Ω	300W70Ω	1
	3.7	Built-in		400W40Ω	400W40Ω	1
380V	0.75	Built-in		80W750Ω	80W750Ω	1
	1.5	Built-in		160W400Ω	160W400Ω	1
	2.2	Built-in		300W250Ω	300W250Ω	1
	3.7	Built-in		400W150Ω	400W150Ω	1
	5.5	Built-in		600W100Ω	600W100Ω	1
	7.5	Built-in		800W75Ω	800W75Ω	1
	11	Built-in		1000W50Ω	1000W50Ω	1
	15	Built-in		1500W40Ω	1500W40Ω	1
	18.5	4030	1	2500W35Ω	2500W35Ω	1
	22	4030	1	3000W27.2Ω	1500W13.6Ω	2
	30	4030	1	5000W19.2Ω	2500W9.6Ω	2
	37	4045	1	6000W16Ω	1500W5Ω	4
	45	4045	1	9600W13.6Ω	1200W6.8Ω	8
	55	4030	2	12000W10Ω	1500W5Ω	8
	75	4045	2	19200W6.8Ω	1200W6.8Ω	16

2.Remote-operated adapter and extended cable

There are two selections available for remote operation on the inverter ZVF9V series. If it is operated at short range（≤15m）, just extend the shielding cable directly and connect it to the operator panel. Our company can provide a range of extended shielding cables with different specifications such as 1m, 1.5m, 2m, 3m, 5m and 10m. If there is any special requirement on cable length, just place an order with the company.

WARNING

• When proceeding remote controlled wiring, DO disconnect power supply.

Installation Procedure:
Proceed in accordance with the methods described in Clause 3.2.2 in this manual.

3. Serial Communication (COM)

The standard machine type of the inverter ZVF9V series does not provide RS232 and RS485 communication function. User shall mark out the function at the time of order. The control terminals of standard RS232 and RS485 communication interface may connect to RS232 or RS485 communication cable to realize network control or ratio interlocking control.

RS232 and RS485 serial communication protocol for the inverter ZVF9V series can be operated under Windows98/2000. And the monitoring software for this series, featured by friendly man-machine operation interface, can easily realize networking operation and perform monitoring and other functions of the inverter. Please contact the service center of this company or its agents if it is needed.

Appendix Table 1: Inverter System EMI Prevention

The electromagnetic environment is very complicated in industrial occasions. Besides, the inverter's working principle also decides that EMI exists in the inverter itself. So it is very important to solve EMC problems effectively to ensure reliable running of the system in such a comprehensive condition. In this chapter, we give a research on EMC and provide corresponding solutions to EMC, in hope of being helpful to you to solve practical problems.

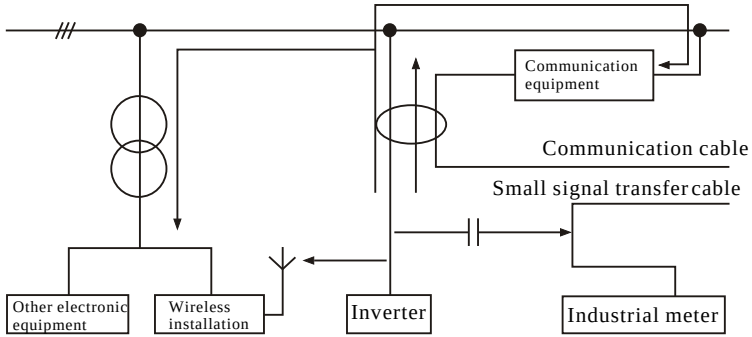
EMI Types and propagation mode

Type	Propagation mode
Conducted interference A:	①Common-base impedance coupling ②Common source impedance coupling
Radiated interference B:	①Near field coupling ② Far field coupling
Inductive interference C:	①Electric coupling ②Magnetic field induction

2) Inverter System EMC Solutions
Power supply input cable
①The distortion of power grid waveform caused by superimposed higher harmonic current arisen out of nonlinear rectifier circuit to source impedance may lead to interference over other electrical equipment under the same power grid. This kind of interference is named type A② interference.

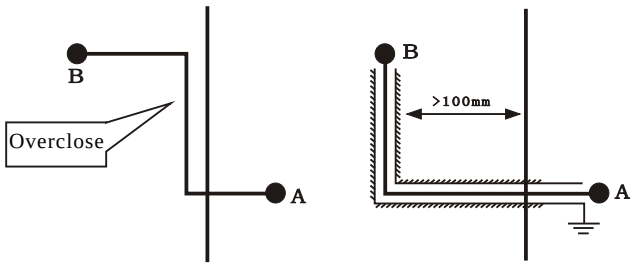
②The power current and higher harmonic current brings in alternating electromagnetic field around the circuit cable, which results in electric field coupling and magnetic flux inductive coupling to the nearer parallel cable such as the communication cable, small signal transmission cable and etc. This kind of interference is named type C① or C② interference.

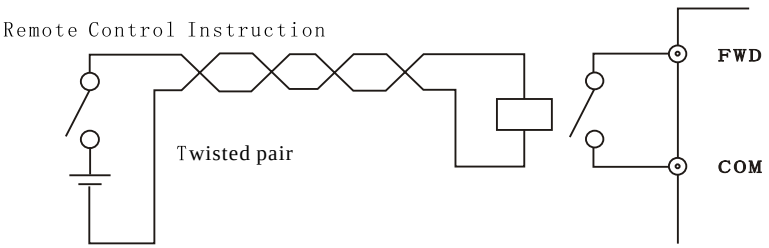
③Due to antenna effect of the cable's shielding layer, interference may be produced over external wireless installation. This kind of interference is named type B① interference.



Propagation Diagram of Input Cable's Interference over External Equipment
Solutions
① This type of interference can be suppressed by installing an EMI power supply filter or isolation transformer in the power supply input side.

② This type of interference can be suppressed through well ordered wiring or shielding. For example, the signal cable may adopt shielded wire and the shielding layer shall be firmly grounded to reduce magnetic flux inductive coupling and electric field coupling. The signal cable should be at least 100mm away from the power cable. If the signal wire and the power cable intersect, please intersect orthogonally. Generally speaking, it is not advisory to use an overlong signal wire. If the operation instruction is far from the inverter, then it is recommended to use an intermediate relay to have a control over it, as shown in the figure below.



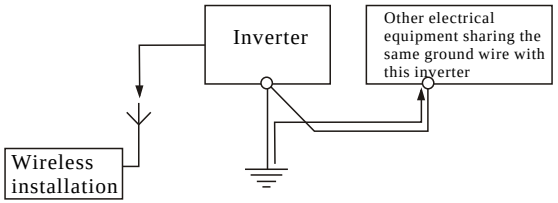


③This type of interference can be suppressed by a good earth ground of the cable's shielding layer or by installing a wireless noise filter (i.e., a ferrite bead).

Inverter Body:

①The leakage of high frequency electromagnetic field (EMF) produced by the high speed switch of the power elements inside the inverter through the inverter's metal slit can result in radiated interference over external wireless installation. This kind of interference is named type B① interference.

②When other electrical equipment (including other inverters) share the same ground with this inverter, then type A① interference will be produced over other equipment if the ground wire impedance is high at this time.

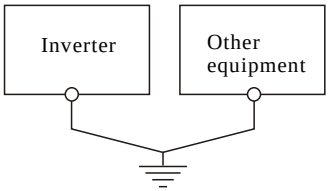


Propagation Diagram of Inverter Body's Interference over External Equipment

Solutions:

①Type B interference can be suppressed by a good earth ground of the inverter housing or by installing the inverter in a well-shielded metal cabinet. Generally, radiated interference produced by the inverter body has less influence on the external equipment.

②It is recommended that other equipment had better connect to the ground through an independent ground wire and share the same or different point beyond the earth electrode with the inverter, as shown in the figure below.

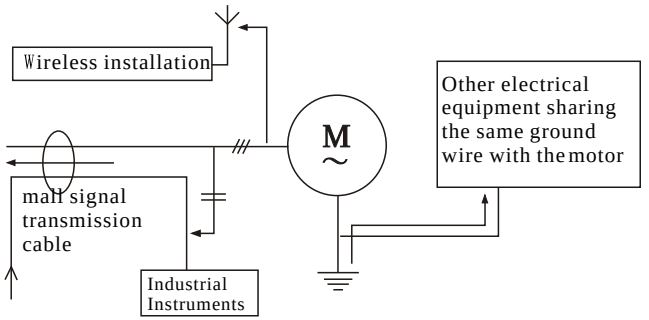


Motor Cable:

①The electromagnetic field (EMF) caused by fundamental current has weaker effect on electric field coupling and magnetic flux inductive coupling of the parallel cable. While the EMF produced by the higher harmonic current has stronger effect on electric field coupling.

②Radiated interference

③Due to the existence of distributed capacity, there is high frequency earth leakage current and interphase leakage current in the cable, which may lead to malfunction of some leakage protection devices such as circuit breaker, relay and other equipment. DO attach importance to these things.



Propagation Diagram of Motor Cable's Interference over External Equipment

Solutions:

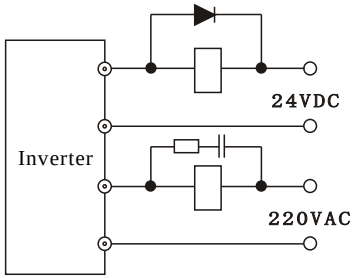
①The basic solutions are the same with the defense of electromagnetic countermeasures of a power cable.

②Install an output wireless noise filter and keep the sensitive equipment away from the motor cable; or the motor cable adopts a well grounded shielded cable and insert this cable in a metal pipe.

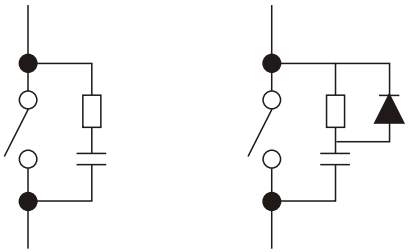
③Use an insensitive leakage protection breaker for the inverter system only; reduce carrier frequency of the inverter; or use an AC (output) reactor to solve this kind of problems.

Relay, contactor and other electromechanical elements:

Instantaneous current and voltage surge will be caused by the close and open of the switch devices such as relay, contactor and etc, which may result in discharging radiation and conductive surge noise. This instantaneous noise must be prevented when designing the peripheral circuit of the inverter, as shown in the figure below.



As for a 24VDC controlled relay, a shunt winding continuous current diode should be inserted at both ends of the coil and pay attention to the polarity of diode. As for a 220VAC controlled contactor, an over-voltage suppressor should be mounted at both ends of the coil (i.e., RC network). Also, the protection of switch contact can not be ignored. This can be realized by forming a shunt winding RC or RCD buffered network, as shown in the figure below.



Attached Table II: Conventional Symbols Illustration

N0.	Name	Figure Symbol	N0.	Name	Figure Symbol
1	AC motor	M	2	Frequency meter	Hz
3	Wattmeter	W	4	Signal light	
5	Ammeter Or Galvanometer	A	6	Voltmeter	V
7	Main circuit terminal		8	Control loop terminal	
9	Contactor		10	Circuit breaker	
11	Thermal relay		12	Relay coil	
13	Reactor		14	Operational amplifier	
15	Diode		16	Optoelectronic coupler	
17	Switch		18	DC power supply	
19	Non-polar capacitor		20	Polar capacitor	
21	Triode (Type NPN)		22	Triode (Type PNP)	
23	Discharge tube		24	Piezo-resistor	
25	Resistor		26	Potentiometer	

Appendix 3 User Parameter Amendment Record

Table Appendix 3-1 User Parameter Amendment Record

Function Code	Function Name	Default Setting	User Setting	Function Code	Function Name	Default Setting	User Setting
F0.00	Control mode setting	1		F1.05	Motor stator resistance	According to specification	
F0.01	Frequency setting mode selection	1		F1.06	Motor rotator resistor	According to specification	
F0.02	Digital frequency control	00		F1.07	Motor stator & rotator inductance	According to specification	
F0.03	Operation frequency setting	50.00 Hz		F1.08	Motor stator & rotator mutual inductance	According to specification	
F0.04	Operation control selection	0		F1.09	Remain		
F0.05	Motor rotating direction	0		F1.10	Slip compensation coefficient	1.00	
F0.06	Upper limit frequency	50.00 Hz		F1.11	Motor pre-excitation selection	0	
F0.07	Lower limit frequency	0.00Hz		F1.12	Motor pre-excitation retaining time	0.2s	
F0.08	Basic operation frequency	50.00 Hz		F1.13	Motor parameter self-learning	0	
F0.09	Max. output voltage	According to specification		F1.14	Speed ring ASR proportional gain	1.00	
F0.10	Model selection	0		F1.15	Speed ring ASRintegral time	2.00s	
F0.11	Torque lifting selection	0		F2.00	Starting mode selection	0	
F0.12	Torque lifting setting	According to specification		F2.01	Starting frequency	1.00Hz	
F0.13	Slip frequency compensation	0.0%		F2.02	Starting frequency Remaining time	0.0s	
F0.14	Acceleration time	According to specification		F2.03	Starting DC braking current	0.0%	
F0.15	Deceleration time	According to specification		F2.04	Starting DC braking time	0.0s	
F0.16	V/F curve setting	0		F2.05	Acceleration/Deceleration mode selection	0	
F0.17	V/F frequency value F1	12.50 Hz		F2.06	S curve initial timeratio	20.0%	
F0.18	V/F voltage value V1	25.0%		F2.07	S curve upper/lower timeratio	60.0%	
F0.19	V/F frequency value F2	25.00 Hz		F2.08	AVR functionselection	1	
F0.20	V/F voltage value V2	50.0%		F2.09	Auto energy-saving selection	0	
F0.21	V/F frequency value F3	37.50 Hz		F2.10	Fwd/Rev dead time	0.0s	
F0.22	V/F voltage value V3	75.0%		F2.11	Shutdown mode selection	0	
F0.23	REV/JOG function selection	1		F2.12	Shutdown DC braking initiating frequency	0.00Hz	
F1.00	Motor rated voltage	According to specification		F2.13	Shutdown DC braking current	0.0%	
F1.01	Motor rated current	According to specification		F2.14	Shutdown DC braking time	0.0s	
F1.02	Motor rated rotating speed	According to specification		F2.15	Power-off restart selection	0	
F1.03	Motor rated frequency	50.00 Hz		F2.16	Power-off restart waiting time	0.5s	
F1.04	Motor vacant load current	According to specification		F2.17	Failure auto reset times	0	

Function Code	Function Name	Default Setting	User Setting	Function Code	Function Name	Default Setting	User Setting
F2.18	Failure reset interval time	3.0s		F3.06	Linear speed coefficient	1.00	
F2.19	JOG operation frequency setting	10.00 Hz		F3.07	Closed-loop display coefficient	1.00	
F2.20	JOG acceleration time setting	According to specification		F3.08	Software edition		
F2.21	JOG deceleration time setting	According to specification		F3.09	Acceleration/Deceleration time unit	0	
F2.22	Acceleration time 2	According to specification		F4.00	Function of Input terminal X1	0	
F2.23	Deceleration time 2	According to specification		F4.01	Function of Input terminal X2	0	
F2.24	Acceleration time 3	According to specification		F4.02	Function of Input terminal X3	0	
F2.25	Deceleration time 3	According to specification		F4.03	Function of Input terminal X4	0	
F2.26	Acceleration time 4	According to specification		F4.04	Function of Input terminal X5	0	
F2.27	Deceleration time 4	According to specification		F4.05	Function of Input terminal X6	0	
F2.28	1st stage speed output frequency	5.00Hz		F4.06	FWD/REV terminal control mode	0	
F2.29	2nd stage speed output frequency	10.00 Hz		F4.07	Open collector Y1 outputsetting	0	
F2.30	3rd stage speed output frequency	15.00 Hz		F4.08	Open collector Y2 outputsetting	1	
F2.31	4th stage speed output frequency	20.00 Hz		F4.09	Programmable relay output setting	12	
F2.32	5th stage speed output frequency	25.00 Hz		F4.10	FDT level setting	10.00 Hz	
F2.33	6th stage speed output frequency	30.00 Hz		F4.11	FDT lagged value	1.00Hz	
F2.34	7th stage speed output frequency	40.00 Hz		F4.12	Frequency arrival FARcheckout range	5.00Hz	
F2.35	Remain	According to specification		F4.13	Overload pre-alarm level	100%	
F2.36	Leap frequency 1	0.00Hz		F4.14	Overload pre-alarm action time	1.0s	
F2.37	Range of leap frequency 1	0.00Hz		F4.15	Counter reset value setting	1	
F2.38	Leap frequency 2	0.00Hz		F4.16	Counter detecting value setting	1	
F2.39	Range of leap frequency 2	0.00Hz		F5.00	AVI inputlower limit voltage	0.0V	
F2.40	Leap frequency 3	0.00Hz		F5.01	AVI inputupper limit voltage	10.0V	
F2.41	Range of leap frequency 3	0.00Hz		F5.02	ACI input lower limit current	0.0mA	
F2.42	Carrier frequency setting			F5.03	ACI input upper limit current	20.0mA	
F2.43	Carrier control mode	1		F5.04	Impulse input lower limit frequency	0.0KHz	
F3.00	LCD language selection	0		F5.05	Impulse input upper limit frequency	10.0KHz	
F3.01	Parameter initializing	0		F5.06	Min. input corresponding setting frequency	0.00Hz	
F3.02	Parameter write protection	0		F5.07	Max. input corresponding setting frequency	50.00Hz	
F3.03	Remain			F5.08	Analog input signal delay time	0.5s	
F3.04	Monitoring parameter 1 selection	0		F5.09	Multi-function analog output AFM	0	
F3.05	Monitoring parameter 2 selection	1		F5.10	Multi-function digital output DFM	2	

Function Code	Function Name	Default Setting	User Setting	Function Code	Function Name	Default Setting	User Setting
F5.11	AFM gain setting	100%		F7.10	Multi-stage speed operating direction 2	000	
F5.12	Remain			F7.11	Wobble operation parameter	000	
F5.13	DFM gain setting	100%		F7.12	Wobble preset frequency	10.00Hz	
F5.14	Remain			F7.13	Wobble preset frequencywaiting time	0.0s	
F5.15	Combined set path setting	000		F7.14	Wobble amplitude range	10.0%	
F5.16	Combined set algorithm setting	00		F7.15	Kick frequency	10.0%	
F6.00	PID action setting	00		F7.16	Wobble period	10.0s	
F6.01	PID set path setting	1		F7.17	Delta wave rising time	50.0%	
F6.02	PID feedback path setting	4		F7.18	Wobble center frequencystandard	10.00Hz	
F6.03	Set digital quantity setting	0.0V		F8.00	Local machine address	1	
F6.04	Feedback path gain	1.00		F8.01	Communication configure	013	
F6.05	Feedback path polarity	0		F8.02	Communication timeout checkout time	10.0s	
F6.06	Proportional grain P	1.00		F8.03	Local machine response delay	5ms	
F6.07	Integral time Ti	1.0s		F8.04	Linking ratio setting	1.00	
F6.08	Differentiating time Td	0.0s		F9.00	Motor overload protection coefficient	105%	
F6.09	Sampling period T	0.00s		F9.01	Under-voltage protection level	According to specification	
F6.10	Deviation limit	0.0%		F9.02	Over-voltage protection level	According to specification	
F6.11	Closed-loop preset frequency	0.00Hz		F9.03	Current limiting level	180%	
F6.12	Preset frequency holding time	0.0s		FA.00	Zero frequency operation threshold value	0.00Hz	
F6.13	Sleep threshold value	10.0V		FA.01	Zero frequency clipping	0.00Hz	
F6.14	Wakeup threshold value	0.0V		FA.02	Energy-comsumption dynamic braking initial voltage	According to specification	
F6.15	Check-out time for Sleep/wake up threshold value	300.0s		FA.03	Energy-comsumption dynamic braking ratio	50%	
F7.00	Programmable operation control	000		FA.04	Cooling fan control	0	
F7.01	Stage 1 operation time	10.0s		FA.05	UP/DOWN terminal modification speed ratio	1.00	
F7.02	Stage 2 operation time	10.0s		FA.06	Over-modulation enabled	0	
F7.03	Stage 3 operation time	10.0s		FA.07	clocking time	0s	
F7.04	Stage 4 operation time	10.0s		FA.08	Remain		
F7.05	Stage 5 operation time	10.0s		FA.09	Remain		
F7.06	Stage 6 operation time	10.0s		FA.10	Remain		
F7.07	Stage 7 operation time	10.0s		FA.11	Remain		
F7.08	Remain			FA.12	Remain		
F7.09	Multi-stage speed operation direction	0000					

Appendix 4 User's Warranty

User's Details

Name of Distributor		Date of Purchase	
Inverter Model(s)		Identification Number	
Name of Equipment		Power Capability of the Motor	
Date of Installation		Date of Use	

Maintenance Record

Failure Cause
Settlement
Date of Maintenance Serviceman Signature

Failure Cause
Settlement
Date of Maintenance Serviceman Signature

TIP

This copy is for the holder (user) only.

Inverter User's Warranty

User's Details

User's Work Unit		Tel	
Add.		Post Code	
Contact Person		Department	

Name of Distributor		Add/Tel	
Date of Purchase		Bill Number	

Inverter Model(s)		Identification Number	
Name of Equipment		Power Capability of the Motor	
Date of Installation		Date of Use	

Description of Use
Description of Parameter Amendment

TIP

User shall fill it out based on the facts with care and return it to us as soon as possible, so that we could serve you better to avoid inconvenience or loss caused by your improper installation or error use.